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PLAIN TALK TO SMALL OWNERS IN WEST INDIAN ISLANDS.*

By His Honour F. H. Watkins, Commissioner of Montserrat.)

IT is my intention this afternoon to speak on one or two matters of interest to those connected with agriculture, and especially to small owners and those engaged in the development of what are called 'minor industries.' I cannot speak with deep practical experience, but there are points which must strike anyone who moves about Montserrat with his eyes open and who reads what is passing in the outside world of agriculture. My address will therefore be composed largely of notes prepared from the value able publications of the Imperial Department of Agriculture for the West Indies, the United States Department of Agriculture, the Department of Public Gardens and Plantations in Jamaica, and other reliable sources, confirmed by personal experience and observation.

Importance of Good Seed.—While many of the dangers to crops cannot altogether be avoided, it may be possible, with care and foresight, to keep clear of some which are commonly unnoticed. One of the most important considerations at the outset is to secure reliable seed of good varieties of plants. As I have ften said, and inferior variety requires, as a rule, more care and attention than a better and more vigorous variety, while the difference in the sale of produce of he two means, in many cases, the difference between profit and loss. Good seed is absolutely essential to successful cultivation. Efforts should, moreover, be made gradually to improve your crops, by careful selection. A Canadian farmer, by careful selection extending over a number of years, has gained a world-wide reputation for the quality of his seed and is able to dispose, at fancy prices, of a large crop for seed purposes alone. On the other hand, a leading planter in Antigua, by having inferior onion seed sent him by mistake lately suffered a large loss. *Be sure to ask for the best seeds and varieties, and insist upon obtaining them.*

Value of the Soil.—Every farseeing landowner bears in mind that his land is so much capital. Every crop taken from the land removes certain substances from the soil. If you desire to continue to derive full benefit from the land, you must feed and replenish the soil, otherwise you will be living on, and eating up, your capital. Too little importance is attached to this essential matter especially by those working provision grounds. 'Nature,' as has been wisely said, 'is a strict accountant; and if you demand of her, in one direction, more than she is prepared to lay out, she balances the account by making the deduction elsewhere.' You must, therefore, feed, or, in other words, manure and fertilize the land.

Class of Manure.—Manures may be divided into two classes:—

(*a*) Complete manures, which contain everything which the crop requires.

(*b*) Incomplete manures, containing certain ingredients and constituents required by particular crops and soils.

Here, the nutritive requirements of the different crops and soils have to be considered, and the small owner would do well to obtain the advice of those with experience of manures.

Estate Yard Manure.—Of complete manures by far the best is ordinary estate yard manure. Nothing better can be wished for when it is properly made and can be obtained in sufficient quantity. Not only does it contain the ingredients required by every crop, but also a large quantity of valuable organic matter, which in addition to its value as plant food improves the general condition of the land, opening up stiff soils to admit air, and helping to conserve moisture in light soils.

Green manuring.—Peas, beans, and other leguminous plants have the power, which most plants have not, of taking in the nitrogen of the air and building it up into substances of great value to plant life. When

* (*From Imperial Department of Agriculture for the West Indies.*

such plants are dug in they decay and add this nitrogenous matter to the soil, and thus to future crops This is one of the cheapest ways of enriching the soil. Many people having stock, turn the cattle into the field when the green dressing is ready and apply, with advantage, the manure thus obtained to the land.

Value of Lime in Manuring.—Although I have advised you, in the case of incomplete manures, to obtain expert knowledge as to their application, a few words on the use of lime in agriculture may be in place. Lime is of value directly and indirectly. Directly, it supplies a necessary element of plant food in soils deficient in lime; indirectly, it unlocks the unavailable potash, nitrogen, etc., in the soil. It also exerts influence on the mechanical condition of soils, rendering heavy soils loose and binding together loose soils. Care should, however, be taken in its application, for, used alone, lime, in most cases is rather a stimulant than a fertilizer. There are two old sayings, 'Lime makes rich fathers but poor sons,' and 'The use of lime without manure makes both farm and farmer poor.' It should always be used together with other necessary manures and fertilizers, and infrequently applied small quantities rather than in large quantities at long intervals. About 3 cwt. per acre every year would be sufficient as a rule in Montserrat.

Crops.—Commercially considered, crops may be divided into two classes:

(*a*) Those for home consumption which do away with the necessity of importing food. These may be termed our 'Agricultural Defence Force,' for they enable the labourer and, in fact, everyone, to save money.

(*b*) Those for export, constituting our 'Attacking Force' which will enable the island to make money.

FOODSTUFFS FOR HOME CONSUMPTION.

'Avoiding unnecessary expenditure is one of the ways of increasing capital. Sufficient consideration has not been paid during the past, in Montserrat, to growing foodstuffs for home consumption. In a valuable paper by the Hon. F. Watts upon the food supplies of the Leeward Islands, (*West Indian Bulletin*, Vol. 1, pp. 270-280), it is pointed out that the value of foods, exclusive of liquors imported into the Colony in 1898 was £132,728, an amount larger than the revenue of the whole of these islands.

It is admitted that a quarter of these imported foods might reasonably be replaced by home-grown produce. It is well worth while to turn some attention to those vegetables and foodstuffs which can be stored and put to use at times when both employment and provisions are scarce and when we have to rely upon articles of food imported from other lands. Among those which will keep I shall deal with yams, farine, and corn.

Yams.—The Government has recently introduced from Antigua and Barbados good varieties of yams. Last year about a quarter of an acre (between two and three 'tasks') was planted in yams at the Chateau or Hospital Garden. Nearly 27 barrelsful were reaped, containing about 130 lb. each, or 3,510 lb. in all which at ½d. per lb. means a gross return of £28 per acre. The land had been carefully dressed and manured and was rich. When reaped they should be kept dry with plenty of air passing around them. A dusting of slacked lime is at times useful. A ready market is found for yams in Trinidad and elsewhere. but even if they are not sold, they are useful in the months of scarcity and want of employment. Care should be taken to plant the different varieties apart, especially the long thin yams which are more suitable for baking. Several barrels of white eddoes and tannias, which are highly appreciated in Barbados, have also been obtained for distribution.

'Farine.'—Efforts have been made to teach people how to make farine from the root of the cassava plant because it can be stored—a property not belonging to cassava roots. Farine will keep for months or years, and in Dominica and St. Vincent nearly every labourer has his barrel of farine which comes in useful about the middle of the year. There are numerous ways in which this valuable meal can be used as a food. All that is required for its manufacture is a small pan or copper, one of which has recently been erected at the Hospital Garden. Instruction to about fifty people in the manufacture of farine has been given at the Experiment Station at the Grove and elsewhere during the past year.

Maize.—Many persons grow maize or what is called native corn. Recently I bought 7 barrels of corn, on the husk, for 21 shillings. When shelled they gave 65 gallons, or rather more than 8 bushels, equal to 4 bags of American corn which is now selling at 10s. a bag. I thus saved more than 20s. besides retaining the cob, which, ground with the grain in a suitable mill, adds largely to its nutritive and digestive properties. The great objection raised by people to the more extensive cultivation of native corn is that it will not keep. I am of opinion, however, that with care and attention native corn may be preserved much longer than is usual in Montserrat. One or two hints may be of use.

(*a.*) Never pick corn on a wet day nor, if possible, until after the sun has shone upon it some hours.

(*b.*) The common practice of gathering and storing corn with the husks still enclosing the ear is advocated by many from a belief that the husks serve to protect the grain from the attacks of insects. The insects most destructive to stored corn are the grain moth and several weevils, and, as the corn may be infested by these insects while still in the field, there is little to support the idea that the husk serves as a protection. It is like shutting the stable door after the horse has been stolen. The husks add to the bulk of stored corn, afford little protection from insects, and provide the best of hiding places for rats and mice. Most of the corn has to be husked before it can be used. Husking can be done more rapidly while the corn is being gathered than at any other time, and, under ordinary circumstances, it is the best time for doing the work.

(*c*) When it has been gathered and husked, it should be put into boxes or barrels of which the bottoms and sides are perfectly tight or hermetically sealed, and treated with bisulphide of carbon to kill the insects. If thoroughly dry, when brought in from the field, it may be thus packed for several days without fear of heating and moulding, and if treated with bisulphide of carbon it will be secure from insects for some months. One to three pounds of the liquid will be found sufficient for 100 bushels or 50 bags, and it costs about 1s. per lb. The process is to pour the liquid over the grain and to cover all over closely with tarpaulin or sacks. Special care should be taken not to allow lamps or lights of any kind near the building where it is used, until the odour has disappeared, which will be from 3 to 6 days after the application. Seed corn should not be treated for longer than 24 hours; the box should then be opened and the vapour allowed to pass off. I have already spoken to you of the importance of carefully selecting the seed. The usual custom is to sell the best cobs, reserving the worst for seed purposes. Carefully go through your corn and select the largest and most vigorous cobs, and a great difference in the yield of your future crops will be the result. Opinions differ as to whether the best and most vigorous seed is to be found at the top or bottom at the cob. It would be an interesting experiment if you were to cut some cobs in two, separating the seeds at the bottom from those at the top, to plant them in two plots of equal size and notice the difference in yield, if any. It would be well for the small owners of a district to combine and purchase a corn sheller and also a corn mill. A corn mill would cost about £1 5. 0. to £1 10. 0. landed, as would also a corn sheller.

FOODSTUFFS FOR EXPORT.

With regard to our attacking force, or articles of food for export, there is no reason why small owners should not make Montserrat the kitchen or market garden for the neighbouring islands. The chief of

these vegetables and foodstuffs to call for our attention are; onions, potatoes and other table vegetables, cacao, ginger and honey.

ONIONS.—Last year seed was obtained from Teneriffe, but a sufficient quantity was not available to meet the demand. Many of those engaged in the industry lost their first sowings owing to the heavy rains of September and October. All, however, who have reaped and are reaping have every cause to be fully satisfied with the results, both as regards quality and quantity. When establishing their onion industry Bermuda had for many years to struggle against far more adverse circumstances than those experienced in this island, and we have the advantage of starting strengthened by the experience of others as to the best methods of cultivation on which I venture to give a few hints.

Onions require a light, friable, well drained, and well manured soil. When planted, they should be carefully weeded and watered, and when pulled they should be carefully laid out on the floor, for 10 to 14 days, away from the sun and rain, both of which are likely to injure the bulbs. Crates for shipping the onions are obtained from Halifax by the Canadian boats. (*a*) The size of the crates is:—Ends, 16 in. long, 7in.wide, ¾ inch thick, planed one side, 3 ends to a crate · slats 2½ in. wide, 3-8 in. thick, planed one side 14 slats to a crate, One bundle of ends and 2 bundles of slats will make ten crates complete. (*b*) Cost; $6.00 (£1. 5) per 100, free on board. Freight: $3 00 (12/6) per 100. With regard to onions, a merchant in New York writes advising shipping as soon as possible in December. 'That is the right time to start if you can possibly do so, so as to have everything marketed before Bermuda starts. When she starts, prices are apt to drop very suddenly. This drop usually occurs in April, about the middle of the month. Do not forget to have your onions packed *immediately before* the sailing of the vessel bringing them; always have them freshly packed and the crates tightly filled. They always lose considerably in transit, consequently every care must be taken to ensure their arrival in good condition—everything depends on this.' Thus it is a case of the early bird getting the worm. I should like some of you to experiment in keeping onions. From July to the end of the year, onions at times command what may be called fancy prices in these islands. The seed should be obtained direct from Teneriffe, for it is cheaper, costing about 4s. per lb. landed here, and is more reliable. Six pounds of seed are sufficient for an acre.

ENGLISH POTATOES.—From the experience of those who have grown English potatoes within the last two years, it seems to be difficult to obtain reliable results except at an elevation of 800 to 1,000 feet. Excellent potatoes have been obtained at low elevation but the results are by no means so certain as in the case of onions. Further experiments are being made and it is hoped soon that we shall be better qualified to speak on this vegetable and offer recommendations of a practical character.

OTHER VEGETABLES.—A large number of Boer prisoners are shortly to arrive in Antigua, and this may afford an opportunity for a temporary market for the disposal of green and other vegetables. It is not to be expected that any of the usual articles of consumption, such as meat, will be directly obtained from these islands, but there is a likelihood of a demand for vegetables and ground provisions which could be grown in Montserrat. In selecting the kind of vegetable to be planted, it must be borne in mind that Montserrat is without telegraphic communication and that steam and other opportunities are rare and uncertain. Only such vegetables as will keep for, at least, a week after being gathered should be planted. Lettuce, for instance, may be regarded as out of the question. Among those to be selected should be squashes, carrots, turnips, khol-rabi, radishes, egg-plant, pumpkins, melons, beetroot and, of course, onions and potatoes. The following hints as to the cultivation of each of the plants named have been taken from reliable sources of information. On the cultivation of such plants as ochros, pigeon peas sweet potatoes, etc., I need hardly speak. As a general rule bulbous vegetables should be sown in the open ground at once, but non-bulbous plants should first be sown in boxes and then transplanted in showery weather or after rain.

Squashes.—A light, rich soil deeply worked is best. Plenty of stable manure will be repaid by increased yields. They should be planted in hills 4 feet wide and covered to a depth of 1 to 3 inches. One ounce of seed will plant 25 hills. Weeds should be kept down and the hoe used as soon as the vines begin to run. As a rule, the squash may be gathered in 50 days. Some of the scalloped or 'pattypan' varieties are excellent and suitable for shipping.

Carrots.—Carrots require rich, deep soil of a friable character. They should be grown in rows 1 foot apart. The seed should be covered lightly and pressed down firmly. If radish seed be sown in the same row it will break the surface and mark the rows so that relief will be given in case the ground should bake. Thin out to 4 inches in the row. One ounce will plant a row of 100 feet long and may be gathered in 70 to 120 days. Carrots are best eaten when young.

Tomatoes.—A clayey soil is liked by some, sandy by others. The land should be deeply dug, and plenty of manure will make good tomatoes on almost any soil. Sow the seed in boxes, and when the plants are two to three inches high transplant 3 feet apart in rows 3½ feet apart. Thorough cultivation, loosening the soil, and killing the weeds will be required until the plants begin to cover the ground. The soil should be moulded up 3 to 4 inches. Some support, trellis-work or sticks, is necessary to keep the fruit off the ground. One ounce of seed will produce 1,500 plants and they take 3 to 4 months to come to perfection. Great care should be taken in preparing the fruit for the market. It should be fully grown but still green, if to be shipped. It should not be bruised, and each fruit must be wrapped in paper.

Turnips.—Rich and finely powdered, sandy or gravelly soil is best. Turnips are sown in drills 1 foot and ½ inch deep. Water freely, and cover with straw to prevent them being scorched. The plants should stand at least 3 inches apart. When gathered, the tops may be cut off and sold separately for greens. One ounce of seed is enough for 150 feet of drill, and turnips mature in about two months. If kept too long they become pithy and hot.

Khol-Rabi.—This vegetable, as its name implies, is apparently a cross between a cabbage and a turnip. It is usual to sow the seed thinly in boxes or nursery beds and, when sufficiently strong, to transplant the seedlings into well manured ground 9 inches apart in rows 18 inches distant. At the 'Meadow' it has been treated as a turnip with successful results. It comes to maturity in two to three months.

Radishes.—Radishes require little space, should be grown on a nice rich soil and sown thinly on a bed, the drills being 12 inches apart, and the plants 3 inches in the drill covered 1 inch deep. The plants should be thinned promptly, watered well and covered with litter if exposed too much to the sun. Radishes should be eaten young; otherwise they become tough and indigestible. The young leaves make an excellent salad. One ounce of seed will sow 100 feet of drill. They are ready for use in 20 to 40 days according to the kind.

Cucumbers.—The great thing to be guarded against in growing cucumbers is the attack of grubs and insects. As a rule cucumbers and squashes do best on newly dug land, that is, where no crop has recently been planted. The seed should be sown 1½ inches deep in a warm, light, sandy soil, in a mixture of cow manure and wood ashes, on hills a foot high, 4 to 5 feet wide, and 6 to 8 feet apart, which have been thoroughly prepared by digging, raking and mixing with stable manure. There is a tendency to an excess of leaf to the detriment of the fruit by the

use of improper fertilizers. The plants when young must be carefully weeded, great care being required not to move or injure the cucumbers. One or two ounces of seed will plant 100 hills and the cucumbers may be picked in 50 to 75 days.

Melons.—The cultivation of melons is very similar to that of cucumbers, but more heat, light and air are necessary, and not so much moisture. The vines may be pinched back if they run too far. Musk melons require 2 ounces to 100 hills, water melons 4 ounces. Musk melons ripen in about 100 days; water melons in 120 days.

Egg-plant or the French Aubergine.—This plant will thrive in any good soil. The seed is sown in boxes or beds, and when about an inch or two high, planted out in beds 3 feet apart in rows 3 feet apart. They require shelter and much water. Thinning out improves the size of the fruit. It is a good plan to graft the egg-plants on the common shushumber. This method may be learnt on application to Mr. Jordan at the Grove Experiment Station.

Pumpkins.—Can be planted like squashes, but at double or treble the distance, and only one plant to a hill.

Beet Root.—Should be sown from July to January, at intervals, so as to secure a succession, in a sandy soil in drills 15 inches apart. The young plants are thinned out to allow 9 inches. The seed might be soaked in lukewarm water for some hours and, while still moist sown 1½ to 2 inches deep.

A valuable pamphlet (No 8) entitled *Cultivation of Vegetables in Barbados* published by the Imperial Department of Agriculture should be in the hands of every small owner It costs only *2d* and is obtainable in this island, with other publications of the Department, from Mr. W. Llewellyn Wall, Plymouth: and elsewhere from the Local Agents of the Department.

(*To be Continued.*)

ON SOME NEW SPECIES OF EUCALYPTUS.

By R. T. Baker, F. L. S., Curator, Technological Museum, Sydney.

[*From the Proceedings of the Linnean Society of New South Wales, 1900, Part 4, October 31st.*]

E. intermedia, sp. nov.

"Bloodwood" or "Bastard Bloodwood,"

(Plate xlvi., fig. 1.)

A medium-sized tree with a *light brown fibrous* bark.

Leaves lanceolate, acuminate, about 6 inches long, and 1-1½ inches wide or more, pale on the underside; lateral veins oblique, fine, numerous, parallel; intermarginal vein quite close to the edge.

Flowers mostly in large terminal corymbs. Calyx turbinate, 4 lines in diameter, 3 lines long, on a pedicle of about 4 lines. Ovary flat-topped. Stamens all fertile; anthers parallel, opening by longitudinal slits.

Fruits urceolate, about 6 lines long, 4-5 lines in diameter, contracted at the orifice to some times 2 lines; rim thin, capsule sunken.

Hab.—Ballina (W. Bauerlen); Richmond and Clarence Rivers (Rev. Dr, Woolls); Barney's Wharf, Cambewarra (W. Bauerlen, P. Macpherson).

A tree closely allied to both *E. corymbosa*, Sm., and *E. eximia*, Schau. It has, however, always been considered as the northern form of the former species, but in botanical characters it more nearly resembles the latter, and especially *E. maculata*, Hook. The chemical constituents and optical features place it midway between the two former. It differs from *E.corymbosa* in the nature of the timber, bark, oil and fruits which have not the marked recurved rim of that species.

From *E. eximia*, it differs in having pedicellate fruits, a stringy flaky bark, a pinkish timber, and in its chemical constituents.

Dr. Wolls was cognisant of the differences existing between these species, for in his "Flora of Australia" (p. 238) he states:—"At the Clarence and Richmond Rivers the 'Bloodwood' prevails to a great extent, and the workmen reckon two kinds—the one with smooth and the other with rough bark. . . It seems probable that the Mountain 'Bloodwood' (*E. eximia*), which overhangs the valley of the Grose, is different from the Bloodwood of the north." As stated above, other botanist have always regarded the northern "Bloodwood" as identical with the Sydney and southern "Bloodwood"; but Dr. Wolls is the only one who connected it (the northern one) with *E. eximia*, Schau., and recent observations also show it to have affinities with that species.

Its physical characters, however, are so evenly balanced between the two that it is decided to give it specific rank.

It diff rs from *E. terminalis*, F. v. M., the "Bloodwood" of the interior, in its bark, timber and oil; and from *E. trachyphloia* in its larger fruits, bark and chemical constituents.

Its fruits are exactly identical in size and shape with those of *E. maculata*, but it resembles this spotted gum in no other characters.

This tree is constant throughout an extensive range, as it was found many years ago at Barney's Wharf, Cambewarra, by W. Bauerlen, who forwarded specimens to the late Baron von Mueller, who considered it a hybrid between *E. corymbosa*, and *E. maculata*, but of course he only had dried material upon which to base his opinion.

The timber of both the southern and northern trees is similar in colour, hardness and other characters, and the chemical constituents of the oil show no variation.

Timber.—A pale-coloured timber, hard, strait-grained, and easy to work. It is much closer in texture than the Sydney Bloodwood, *E. corymbosa*, Sm. The figure is occasionally not unlike that of *E. maculata*, Hook. Gum veins are not infrequent. It is considered a good durable timber, and superior to that of *E. corymbosa*, Sm. It has quite a metallic ring when the fractured edges of a piece are rubbed together.

Oil.—The yield from this oil is ·125 per cent It consists very largely of pinene, 58 per cent. of the oil distilling below 170° C.; only a trace of eucalyptol could be detected. The specific gravity of the crude oil @ 15° C. = ·8829. The specific rotation of the crude oil [a] D = + 11·2°. This oil differs from the oil of the Bloodwood of the Sydney district, inasmuch as the latter is lævo-rotatory to about the same extent. The rotation of the oils from *E. corymbosa*, Sm., and *E. eximia*, Schau., and this species varies in about equal proportions, that of the oil of this species being about half-way between those of *E. corymbosa*, and *E. eximia*, although the constituents of the oils of the three species differ but slightly, being largely pinene.

E. angophoroides, sp. nov.

"Apple-Top Box."

(Syn. *E. Bridgesiana*, Baker, *partim.*)

(Plate xlvi., figs. 4*a*, 4*b*, 4*c*.)

A medium-sized tree with a white box bark persistent to the ultimate branchlets.

Sucker leaves ovate-acuminate, cordate, shortly petiolate, glaucous, variable in size from 1 to 3 or 4 inches long, and 1 to 3 inches broad; venation indistinct on both sides. Leaves of mature trees narrow-lanceolate, about 6 inches long, acuminate, not shining, of the same colour on both sides; venation finely marked, oblique, spreading; intramarginal vein removed from the edge. Oil glands numerous.

Peduncles axillary, 3 to 4 lines long, slightly compressed, bearing a few flowers, Calyx hemispherical

to payriform, 1 line long; pediole about 1 line long. Operculum hemispherical, shortly acuminate. Ovary domed. Stamens all fertile; anthers parallel, opening by longitudinal slits.

Fruits hemispherical to slightly pear-shaped, 2 lines in diameter and under 4 lines long; rim thick, sloping outwards—a ring just below the edge; valves generally 4, exserted under 1 line.

Hab.—Colombo, N. S. W. (W. Bauerlen); Towrang N. S. W. (R. T. Baker).

The herbarium material of this species is so similar to that of *E. Bridgesiana*, that on my first examination it was included under that species (Proc. Linn. Soc. N. S. W., 1896.)

My field observations since that date, and the aquisition of further material such as timber and oil, have convinced me that two trees are quite different, and should not be included under the same name. Mr. W. Bauerlen, indeed, who has known the trees for very many years, has always held that the two were different in specific characters.

E. Bridgesiana is known vernacularly as "Apple" and "Woolly-butt," but this tree as "Apple-top Box." As stated above, the foliage, fruits and flowers certainly resemble those of the former species, but there the similarity ends. The bark is a true box-bark, but the timber is quite unlike that of a box.

It differs from *E. Cambagei*, Deane & Maiden, in the superiority of its timber and the inferiority of its oil, and the shape of its fruits; and from *E. nova-anglica*, Dean & Maiden, in the bark, colour of timber, and oil.

It has little affinity with such Boxes as *E. hemiphloia*, F. v. M., *E. Woollsiana*, Baker, *E. conica*, Dean & Maiden, *E. pendula*, A. Cunn., (*E. largiflorens*, F. v. M.,) although it appears to be a connecting link with these and what are known as *Bastard Boxes* such as *E. Cambagei*, Dean & Maiden, and *E. bicolor*, A. Cunn.

It is quite limited in its distribution, and presents no difficulty of determination in the field.

The bark has not an essential oil as pertains to *E. nova-anglica*, and *E. bridgesiana.*

Although it has a regular light-coloured grey box bark, yet the appearance of the tree is more like that of an "Apple tree" (*Angophora*), hence the local name of "Apple-Top Box."

Timber.—A pale-coloured, soft specifically light timber, open in the grain, and perhaps to be regarded as porous. It has not the broad sapwood of *E. Bridgesiana*, Baker. It seasons well, and is suited for cabinet work, as it closely resembles in colour, weight and texture the timber of *Angophora intermedia*, DC. It is much superior to that of *E. Bridgesiana.*

Oil.—The yield of oil from this species is ·185 per cent. A large quantity of phellandrene is present, also some pinene, and 26 per cent. of eucalyptol was found in the rectified oil (fraction representing 70 per cent. of the crude oil). The specific gravity of the crude oil at 15° C. was ·9049; the specific rotation of the crude oil = [a] D—12·7, the lævo-rotation being due to the phellandrene. The constituents of this tree differ greatly from those obtained for *E. Bridgesiana*, Backer, a species which in appearance it somewhat resembles. The oil of *E. Bridgesiana* is of excellent quality, while that of this species is of litte commercial value, irrespective of the small yield H. G. Smith).

E. Wilkinsoniana, sp. nov.

(Syn. *E. hæmastoma*, var., F.v.M., Eucalyptographia, Dec. ii.; *E. lævopinea*, var. *minor*, Baker).

(Plate xlvi., fig. 2)

A medium-sized tree with a thin compressed stringy-bark—not furrowed.

Sucker leaves lanceolate, falcate, generally under 3 inches long and under 6 lines wide, oblique, thin; venation oblique, parallel, distant: marginal vein removed from the edge. Leaves of mature trees similar to sucker-leaves, only larger.

Flowers in axillary peduncles of about 6 lines long. Calyx small, 1 line long, 2 lines in diameter pedicle about 1 line. Operculu small, hemispherical, acuminate. Outer stems apparently sterile: anthers kidney-shaped. Ovary flat-topped

Fruits hemispherical, 5 lines in diameter, rim thick, *red*; valves slightly exserted, acute.

Hab—Dromedary Mountain (C. S. Wilkinson, F.G.S.); Colombo (W. Bauerlen); Barber's Creek (H. Rumsay); Sutton Forest (R. T. Baker).

This is the "Stringbark" variety of *E. hamastomæ* Sm., mentioned by Baron von Mueller in his Eucalyptographia under that species.

It was first observed in this colony by the late Government Geologist, Mr. C. S. Wilkinson, F. G.S., at Dromedary Mountain at an elevation of 1,500 ft. above sea level, and named for him by Mueller as stated above

It differs, however, from *E. hæmastoma*, Sm., in the nature of the timber, texture and venation of leaves, bark and chemical constituents of the oil and kino; and it is on these differences that it is now raised to specific rank.

The bark and timber ally it to *E. eugenioids*, "White Stringybark," and in botanical sequence it is placed next to that species.

The oil resembles that of *E. lævopinea*, Baker, but on other characters connect it with that species.

The fruits, and particularly the oil, differentiate it from the other "Stringybark" such as *E. capitellata*, Sm., *E. macrorhyncha*, F.v.M, *E. eugenioides*, Sieb., *F. E. dextropinea*, Baker.

The red rim of the fruits has evidently been the cause of the misplacing of this species, but it is well known now that this is a character common to a number of Eucalyptus.

It is a feature quite absent from *E. lævoeapinea*, Baker. In fact the fruits of the two species are so very different that the trees could not be synonymised with any degree of correctness in specific naming. The bark, leaves, venation and timber of these trees also differ.

E. lævopinen, Baker, has a hard ,compact bark right out to the branchlets, whilst this tree has a light-coloured, loose stringy bark, not extending out to the limbs.

It is quite distinct in specific characters from the two stringybarks described in this paper, viz., *E. nigra* and *E. umbra.*

Timber.—Pale-coloured, very hard, close-grained, heavy. In transverse and compression test, it stands higher than that of any of the other Stringybarks above enumerated. It is evidently an excellent timber, and is strongly recommended for forest conservation.

Oil—The yield of oil from this species averages about ·9 per cent. It consists very largely of lævopinene. A small quantity of eucalyptol is present in the oil at sometime of the year, and a small quantity of phellandrene at others. This terpene alters much, occurring in small quantities in many Eucalyptus oils at certain seasons of the year, whilst at other times it is absent. The specific gravity of the crude oil was ·894 at 15° C.

The specific rotation of the crude oil = D—23·9; no phellandrene was detected in the January oils.

No less than 86 per cent. of the oil distilled below 170° C. The lævo-rotation of this oil is due to the lævopinene present. The odour of the oil after saponificatoin of the small quantity of ester present is exactly that of oil of turpentine (H. G. Smith.)

E. ovalifolia, sp. nov.

"Red Box."

(Plate xlvi., figs. 6*a* 6*b*.)

A medium-sized tree with a smooth bark, decorticating at the base of trunk, producing a roughish appearance.

Leaves small, of light yellowish colour, sometimes glaucous, oval or ovate, shortly acuminate, mostly 2 inches long and ¾ inch wide, rarely 3 inches long;

venation faintly marked, lateral veins distant oblique, spreading, the marginal vein removed from the edge, producing at the base of the leaf a trinervate appearance. Petiole slender, under 1 inch long.

Flowers in axillary or terminal panicles, 6-8 in the head. Calyx under 2 lines long, 1 line in diameter, tapering into a slender pedicle. Operculum hemispherical, depressed, very shortly acuminate. Ovary flat-topped. Outer stamens sterile. Anthers parallel, opening by pores at the truncate end.

Fruits small, 2 lines long and 1½ lines in diameter, rim thin, contracted slightly at the orifice, valves not exserted.

Hab.—Bathurst, Rylstone and Camboon (R. T. Baker) ; Hargraves (A. A. Suttor); Gerogery (L. Mann)

A medium-sized or rather stunted tree growing in poor, sandy, rocky soil. The bark can hardly be said to be smooth, and neither is it altogether a box. bark such as that of *E. albens*, Miq., or *E. hemiphloia*, but rather between a box and a smooth bark, The upper parts of the trunk and limbs are quite smooth.

It is allied to *E .melliodora* in the shape and venation of the leaves, and perhaps in the exterior character of the bark, but it has not the yellow satin on the inner surface of the bark such as obtains in *Emelliodora*. It differs, however, from that species in the shape of the fruits, colour of timber, and chemical constituents of its oil.

It differs from the typical *E. polyanthema*, Sch., of Victoria, which has a persistent box-bark right out to the branchlets, larger and obicular-shaped leaves, and larger fruits. The oils of the two species are not at all identical, but there is a resemblance in their timbers.

It differs from *E. conica*, Deane & Maiden, in having a smoothish bark, and in the shape of the leaves and fruits, and chemical constituents of the oil ; nor can it be confounded with *E. pendula*, A. Cunn., (*E. largiflorens*, F. v. M.) which has a box-bark, and fruits and leaves quite different from this a species.

The timber, leaves and bark differentiate it from the Lignumvitæ, *E. Fletcheri*, Baker, of St. Mary's and Thirlmere.

In botanical sequence it is placed next to *E Dawsoni* Baker, as it approaches this tree in the colour of its timber, and occasionally in the shape of the leaves, but differs in every other respect.

There appears to be no reference to this tree in the writings of Dr. Wools and Mr. A. G Hamilton, both of whom wrote on the Mudgee Flora so that it must have escaped their observations, as it occurs at Hargrave, mid-way between Mudgee and Wellington.

Timber—When growing on poor ironstone ridges the tree becomes rather stunted and the stem has a tendency to barrel, so that it yields only small specimens of timber. It is red-coloured, hard, close and straight-grained, and very durable in the ground. It is suitable for all kinds of heavy work.

Oil,—The yield of oil from this species is ·27 per cent. It contains much phellandrene and but a minute quantity of eucalyptol at time of distillation. It is not, however, a commercial oil. It is distinctly different from *E. polyanthema*, schau., of the south, which gives a commercial oil rich in eucalyptol. The specific gravity of the crude oil at 15° C. is ·9058. The specific rotation of crude oil [a] D=-993°

There is very little difference in the constituents of this oil and that of *E Fletcheri*, Baker, the "Lignum-vitae" or Black Box at St. Mary's, as they both contain the same constituents in practically the same amount (H. G. Smith).

E. Fletcheri, sp. nov.

'Lignum-vitæ," "Box."

(Plate xlv.)

A medium-sized tree with a box-bark on the trunk, branches smooth, branchlets glaucous,

Leaves from orbicular to ovate-acuminate in shape sometimes oblique, cuneate or rounded at the base from 1 inch to 3 or 4 in diameter, thin, not shining; venation faintly marked, lateral veins oblique spreading ; intramarginal vein removed from the edge, more pronounced at the base, giving a trinerved appearance to the leaf. Oil glands very numerous; flowers numerous in axillary or terminal panicles peduncles short, 2-3 lines long.

Buds about 5 lines long. Calyx conical, with scarcely any pedicel. Operculum hemispherical, very shortly accuminate or obtuse.

Ovary flat-topped. Outer stamens sterile. Anthers parallel, opening by terminal pores.

Fruits conical, about 4 lines long, 3 lines broad; rim thin, and mostly in mature fruits with a notch ; capsule sunk.

Hab.—South Creek, St. Mary's (R. T. Baker and N. V. Fletcher); banks of the Nepean River (Rev. Dr. Wools); Thirlmere (W. Cambage).

It is named after the late Norman Fletcher, B. A., a promising young botanist much interested in Eucalypts, who, in Company with the author, some years ago discovered trees of this species at South Creek, St. Mary's near the railway bridge. A tree apparently restricted in its geographical distribution to the watershed of the Nepean River of this colony.

The late Dr. Wools was very probably the first to collect material of this tree for botanical determination, and he forwarded it to Mueller under the local name of "Lignum-vitæ" (Eucalyptographia, Dec. iii). This latter author, working on morphological grounds, confounded it with the Victorian 'Red Box,' *E polyanthema*, Schau. The dried specimens of the two species are very much alike in the shape of the leaves and fruits, but the trees differ considerably in other characters. For instance, the Victorian 'Red Box' has a persistent *box-bark* right out to the branchlets, and a *dark red timber*, while its leaves are larger than those of this species. The New South Wales tree has *thick, rough, flaky bark*, and *the wood which is of a brown colour* towards the centre, is very hard and tough as recorded by Dr. Wools (Fl. Aus. p. 236). The two timbers alone are sufficient to differentiate the trees, whilst their essential oils possess quite distinct chemical constituents.

This is another example showing how essential it is that field observations are required in order to determine correctly the specific rank of Eucalypts.

It generally occurs on the banks of rivers and creeks, growing along with *E. bicolor*, Cunn., but this latter species, although having a somewhat similar bark and timber, is quite different in the fruits leaves, venation and oil,

In colour of timber and bark it appears to stand apart from the western "Boxes," such as *E. Woolsiana E. conica*, Deane & Maiden, *E. albens*, Miq. but in fruit and shape of leaves it resembles *E populifolia* and *E polyanthema*, Schau. whilst it only approaches *E conica* in the shape of the fruit.

The leaves are thinner than those of *E populifolia* and have not the lustre so distinctive of that species.

It differs also from this latter species in the shape of its fruits, and in its timber and oil.

E quadrangalata, Deane & Maiden has a lighter coloured timber, sessile fruits with extended valves and lanceolate leaves.

Timber.—It is well described by Dr. Wools (*loc. cit*). No doubt owing to its good qualities it has been extensively cut by timber-getters as it is quite rare now in its original habitat (Nepean), but is more plentiful at Thirlmere. It is worthy of propagation

Oil.—The yield of oil from this species is ·294 per cent. It contains much phellandrene and but a minute quantity of eucalyptol. In constituents and characters this oil differs but little from that obtained from "Red Box," *E ovalifolia*, Baker, of Rylstone. The specific gravity of the crude oil at 15° C, is ·8805

Specific rotation of crude oil [a] D=-14·2°. The lævo-rotation is due to phellandrene. It is not a commercial oil. The amount of ester and free acid are small in this oil, consequently the crude oil is not very dark-coloured, the red colour of crude eucalyptus oils being due to the presence of a minute quantity of iron from the stills being dissolved in the free acid occuring in the oils. The colour is removed by agitating with potash.

(*To be continued*).

THE IMMORTELLE AS A SHADE TREE FOR CACAO.

By Prof. Carmody, F.I.C., F.C.S., & Mr. J. Verteuil, F.C.S.

(*Read before The Trinidad Society 10th June*, 1902.)

Last year in Agricultural Society paper, No. 155, it was shown that Immortelle flowers were particularly rich in Nitrogen, and it was estimated that they contributed to the soil a larger amount of this substance than was permanently withdrawn by the cacao bean. This year the investigation has been continued, and through the kind co-operation of Mr. J. G. de Gannes we are able to give a more accurate estimate of the Nitrogen supply from these flowers. Mr. de Gannes' valuable report is attached.

This year we have not found any of the samples to contain more than 4·03% of Nitrogen which is considerably less than the 6% found in last year's samples.

Taking Mr. de Gannes' figures and ours (reduced to 3% to be within safe limits) the following calculation is made:—

50 immortelles = 800 lb. *dry* flowers
at 3% of Nitrogen = 24 lb. ℔ acre.
250 Cacao trees = 500 lb. cured cacao
at 2½% of Nitrogen = 12½ lb. per acre.

and shows an excess of about 12 lb. of Nitrogen per acre.

Apart from the question of the retention of the Immortelle as a shade tree, which we submit these figures fully justify. the results of this investigation suggest that flowering trees may be utilized to keep the Nitrogen of the soil in circulation and to conserve it by bringing it from lower depths in a soluble form and periodically spreading it in a less soluble but easily decomposable form on the surface of the soil.

It will be remembered that last year it was stated that the amount of Nitrogen in the flowers rapidly diminishes. We now find that this depends on the methods of storing the samples; and that if the flowers are spread out thinly, instead of in heaps, that there is no less of Nitrogen even when freely exposed for several days to the air.

We now wish to bring to the notice of the members of the Society another point which appears to us to be in favour of the retention of the Immortelle in preference to other shade trees. It has long been observed that the Immortelle drops its leaves during the dry season, and it has been stated to its discredit that it ceases to give the necessary shade at the time when the Cacao trees most require it. It should not be overlooked that one of the functions of the leaf is to evaporate water in large quantities, and in the absence of leaf there must be absence of evaporation. The water evaporated is drawn from the soil by means of the roots, and it follows as a natural consequence that a leafless Immortelle tree does not absorb from the soil that large amount of water which its leaves, if present, would have evaporated, and that this water remains available for the cacao trees which are never entirely leafless. The value of this self-denial on the part of the Immortelle during the dry season when four or five months the rainfall is very low has, we think, not been fully appreciated.

With reference to the previous paper on this subject Professor Carmody has been reminded that he cannot claim to be the first to point to the flower as the special and most valuable feature of the Immortelle as a Cacao shade tree. At the time of writing the paper he believed he was alone in giving expression to such advanced opinion; but he is glad to find that one of the most astute observers among our Cocoa planters, viz: Mr J. P. Bain, has long held and expressed the same view.

La Chance, Arima,
7th April, 1902.

Dear Prof. Carmody,

The Immortelle tree—Anauca—from which I collected the flowers, the flowers, is an isolated tree and was profusely laden with healthy flowers at the time but its size is rather below the average full grown trees. I must here remark that the "Anauco" does not thrive its best in the Vegas. I had underneath the tree properly cleaned, and the flowers were collected carefully and weighed twice a day. The quantity collected amounted to 130 lbs. but a good many were blown away by the wind outside of the area cleaned, and I think by adding 30 lb. to the quantity collected making 160 lb. would be as nearly as possible correct. I regret I did not collect flowers from the "Bocare," it escaped my memory to do so when the trees are flowering, but it is my impression that as they do not bear so profusely as the "Anauca" the weight per tree is less notwithstanding the size of the flowers being larger.

J. G. de Gannes.

GRAPE GROWING IN JAMAICA.

(THE GLENFARG VINES.)

I was first induced to take an interest in grapes culture, by my having attended a series of lectures given at King's House, by the then Superintendent of the Gardens there, Mr. W. J. Thompson, now of Castleton, and so far, I have never had cause to regret it,—and I have never ceased to take a lively interest in all things appertaining to grape culture. During the course of these lectures, I discovered that it was Mr. Thompson's belief that we should not permit our vines to fruit before they were five years old, and that very nearly digusted me of trying to plant any, as I was entirely against waiting for so long a period on any crop. However I was able to procure a few cuttings, and several people who saw me with them, informed me that I would have to wait ten years for a crop. I soon discovered that like many other well known fables, this was untrue in practice, as I was able to produce fine grapes in two years.

Having planted my vines, and after seeing them grow for three months, I was so pleased, that I thought I would go one better. I got an American flower catalogue, and after having read up all the wonderful descriptions given of the Concord, Brighton Eaton, etc., I sent off for $10 worth, and they reached me in good condition, they were planted out and that was all; in nine months they had in some cases put on three or four leaves, and in one case I got one bunch of grapes, which had on five of the sourest grapes one could ever desire to taste. I dug them up, and against American vines I wrote failure and disappointment. In the mean time my other ones had come on nicely, and I now had the opportunity to attend a series of lectures and demonstrations given by Mr. Cradwick here, (in the Hope Gardens) as the vines were now removed from King's House. These demonstrations were very helpful to me, and fully brought out the fact that reading to me was one thing, and ocular demonstration another. I leaned sufficient, to my way of thinking, to prune or rather cut back my vines in that year, and in the early part of the next I pruned off for fruit. The white variety I planted fruited heavily, but all

the nursing could not bring them to perfection, as they began ripening they began splitting and nothing could save them. These vines are what are known as Fosters Seedlings, and so far as my experience goes, they are utterly worthless for a tropical country—though they are far ahead of any other white varieties as a heavy copper. The black varieties—Barbarossa or Black William, and another, Lombardy, did well, and are still doing well. The Black William is certainly the most profitable grape for culture in the plains of Kingston and St. Andrew. This vine here covered a sloping arbour 150 feet long and 21 feet wide before it was four years old, and having been pruned in February of one year, it was never without fruit in all stages for the next eighteen months. At one time it had on over a hundred large bunches. I had the pleasure of sending one to the Director of Public Gardens, and another to Sir Henry Blake. The former sent me a very complimentary letter, and the latter took his to Montego Bay and exhibited it in the Court House there. During the year just passed this vine has excelled all its previous records. On the 2nd February it was pruned by Mr. Greenless and my brother and it received a liberal supply of goats, manure, (four cart loads,) and later on six loads of fresh manure from cow stables, with periodical forking and watering it produced the largest crop. At one time it had on 250 bunches of good grapes. and it was the wonder of all who saw it. We sold Five Pounds Ten Shillings and Sixpence of grapes off this crop alone and gave away quite as much again, besides winning the first prize at the Kingston Flower Show. Acting under the advice of the Botanical Staff I pruned in August, the vine cropped fairly well, but the unusually heavy seasons which followed completely spoilt the crop. I have now planted out twenty of the Muscat of Alexandria and Shafston, Muscat generously given to me by Laurence Tate, Esq., of Shaftston, and fifty of the Black William. I have also through the courtesy of the Director of Public Gardens, six fine plants of the Great Hampton Court vine. The soil here is what is described as a sandy loam; the deeper you dig the more sand you get, and this seems to suit grape growing admirably. The climate is warm during the day and moderately cool at nights. The district is very dry, and here let me say that growing at stake is unsuitable to this country. The vines so treated failed entirely, and common sense shows that if a vine will cover a great area and produce good fruit it ought to be allowed to do so. We have no winter here to check continuous growth. All the vines are on wire arbours and have the full benefit of the sea breeze. That apostle of grape culture, the Revd. Wm. Griffiths, says the reason that black grapes are not liked is that every old woman knows when a white grape is ripe, but nobody knows when the black grape is. As soon as the latter turns purple they are gathered as ripe, and as a result they are sour, and the grape gets a bad name—when every grape turns black the bunch can be permitted to remain on for two weeks, and then they will be as sweet as any white grape, but of course lacking the flavour of the Muscat. Grapes can be grown profitably and easily, and there is lasting fame awaiting the agriculturist with a scientific and experimental turn of mind, when he succeeds in producing a hardy white variety out of the Black William, by cross fertilizing or grafting, which will retain the vigour of the parent stock whilst retaining the delicate Muscat flavour. In conclusion, I must here record my thanks to the Botanical Department for the able assistance always readily given me at all times. Messrs. Cradwick and T. J. Harris have personally visited and given instructions on these vines, and I have never failed to get valuable assistance from the subordinate staff, and to them is due the praise which the success of these vines merit.

W. Ramsay Thomas.

Kingston, 31st March, 1901.

P.S.— I might be pardoned for mentioning the following circumstance. In 1900 the Director of Public Gardens and Plantations was on leave in England. I wrote asking him to try and obtain a few cuttings of the famous Hampton Court Vine; in replying to my letter he said he would try, in due course he returned to Jamica fetching several cuttings and a fine picture of the vine with a book recording its history. I planted six of these cuttings myself, and gave two a neighbour. They have done remarkably well my neighbour's vines started fruiting when a little over nine months before they had the first pruning, and at present they have seven or eight bunches on them.—W.R.T., 8th April, 1902.—*Journal of the Jamaica Agricultural Society.*

PLANTING NOTES.

A Sequoia "Combine."—All lovers of the grandly beautiful in Nature—numbering among them the readers of this Journal—will be glad to learn that an effort is being made to induce the Government of the United States to purchase and preserve the giant trees of California, now threatened by the lumberer—only the Mariposa Grove being the property of the State, the remainder being in the hands of private individuals which spells lumberer. It would be an eternal disgrace to all concerned if these magnificent specimens of an old time variety were to be cut down and converted into furniture, &c. It is affirmed that they adorned the present landscape thousands of years since, and one of those now interested in their preservation affirms that as far as may be, the giants of the Gold State may be considered as immortal? for they are growing now, some of them. But in these days of "combines" —of "trust"—why appeal to Government when a few of the so-called "millionaires" could between them sign a cheque which would save all brother or explosion of sentiment, and render the donors famous for ever—even at the expense of conferring upon the rescued giants the names of all the members of their respective families. A State so rich as is California- -rich in the products of the soil and the metals—could we imagine, easily settle the whole business in a very few days.—*Gardeners' Chronicle.*

Couch Grass.—You have given your correspondent Pan-Adam (see *Gardeners' Chronicle*, p. 331), a laborious task in advising him to trench his land 2 feet deep or more to get rid of Couch grass. About 1 acre of orchard ground here was overrun with this weed, also Mare's Tail, Docks, Nettles, and woodbine, the latter running up the stems of the Apple and Pear-trees besides half smothering some old Currant bushes. Instead of trenching and picking them out, I planted Rhubarb in the worst places, sufficiently close to surround the stems of the trees, but the Currant trees were destroyed as soon as others were raised to take their place, and Rhubarb was planted. The Rhubarb was lifted the third year for forcing, and fresh plantations made each spring, so we have always two or three batches going. The crops that follow the Rhubarb are Jerusalem Artichokes, Scotch, Kale, Winter Greens, and Potatoes, where open space admits of it. I have destroyed the weeds profitably, and in a way that no other known method would have done so effectually, and I would strongly advise Pan-Adam to give my plan a trial. I think the Mare's Tail a most determined grower, and when once it gets a hold on the land or of gravel walks, it defies every means for its destruction. When present in gravel walks I assume that the roots were present in the soil when these were made; at any rate, weed-killers have been applied which destroys the tops, but after a year or two it comes up as vigorously as ever. *W. P. Roberts, Cuerden Hall Gardens, Preston.* [Not every gardener wants large quantities of Rhubarb, or to crop his orchard with Kale, &c. Ed.],—*Ibid.*

PLANT SANITATION.

The advantages gained by sanitation, or preventive medicine in preserving human life and making it more vigorous are universally recognised facts and hardly needed to be supported by data to provo them. Two hundred years ago the mortality in London was 80 per 1,000; it is now about 20; and this has been brought about, not by the possession of knowledge of disease and the moans of combating it, but by continually putting such knowledge into practice.

Tho introduction of sanitary methods is comparatively recent. The first Public Health Act was promulgated in 1848, though local efforts had been made earlier. Since then the tendency of such legislation has been to place the regulation in the hands of the local authorities, subject to a general superintendence by a Government department. Still later has oome the adoption of measures in Britain to protect animals from disease. Until comparatively recently lung disease (contagious pleuro-pneumonia) and foot-and-mouth disease caused large and frequent lossos of cattle, estimated at nearly 2,000,000 per annum—a loss of perhaps £3,000,000 each year. Foot-and-mouth disease has been almost exterminated. Glanders, which was responsible for the loss of large numbers of cavalry horses, is now rare both in tho Army and in private stables. Rabies will no doubt be at no distant dato recorded in the category of extinct diseases in Britain, if preventive measures are continuously and thoroughly carried out.

Sanitation for mankind was probably induced to some extent by fear; for animals partly from motives of benevolence, but mainly for economic reasons. Plant sanitation also must be considered for economic reasons. Increase of population necessitates larger food supplies. The fight of the farmer in Britain and the planter in Greater Britain must become more strenuous as competition, cheapness of transport, and the opening up of new countries go on. Yet while many means of producing larger crops and improved varieties have been devised and made use of, no means for keeping cultivated plants in health, or preventing the spread of epidemics, havo been to any extent practised in Britain or encouraged by the State.

That great loss of wealth has been suffered from diseases to plants, figures have been frequently adduced to provo. The potato disease in Ireland caused immense losses and a disastrous famine. The phylloxera on the vines of France reduced the yield of wine by 90 per cent., and spread to and affected other Continental vine-growing countries. Estimates have been carefully made to show that in Australia wheat rust causes a loss of nearly £3,000,000 annually. In 1882 the hop-aphis lost to Kent and Sussex alone about as much. In India the annual loss by wheat-rust has been calculated at not less than £91,000,000. In America in 1882, before any steps were taken to mitigato these evils, the Agricultural Commissioner estimated the enormous sum of from £40,000,000 to £60,000,000 as the amount of waste due to insect diseases alone. Ceylon suffered to the extent of probably over £15,000,000 by the coffee leaf disease, which led to the ruin of the Industry in that island. All these estimates must from tho nature of the data be only approximate; but even if they err on the side of exaggeration it is plain that vast losses have occurred through diseases to cultivated plants.

Can these losses be reduced or to any extent avoided? The answer to this question is found in other lands more than in our country, though in some cases in Britain diseases have been treated with success, and the cultivator has benefited by his intelligent action. Germany and America are in the van in proving the value of knowledge gained and put into practical form in tho use of sanitary measures for plants. The vine industry in France, Italy, Germany, Maderia and other grape-growing countries was almost ruined by the phylloxera, until means were found to minimise the attacks, and varieties of the plants were discovered in other countries which were immune from the ravages of this destructive insect. The vines were still suffering from phylloxora when a mildew or blight, due to a fungus, began to do serious damage to crops. Through a fortunate accident—the spraying of values by the roadside with blue stone to prevent pilfering of fruit—a fungicido was found for this disease, which prevented the extinction of the vine, and is still recognised as the most important substance for spraying in leaf diseases. In America, among other industries orange growing and vine culture have been relieved from various diseases, and organised campaigns have kept the many insect and fungal enemies of these important cultivations in check; and in many wheat-producing countries sterilisation of reed-corn beforo sowing has done much to exterminate smut-diseases.

The large bodies of workers in these countries are to a great extent helped and encouraged by the fact that the people for whom they aro working have an intelligent knowledgo of the methods and results of plant pathology and therapeutics. In America—where money's worth is required for money—£600,000 per annum is spent in supporting a large staff of experts whose efforts are directed to the improvement of agricultural methods, crops and stock, the introduction of new plants, and the prevention and cure of epidemic diseasos.

It is true that there aro cases of plant disease which have not been to any extent lessened or prevented by science. But even in the much older science of human medicine failures might be mentioned, and yet these still unsolved problems of the doctor do not in any degree shake the faith of thinking men in the value of medicine and surgery. The plant doctor has frequently to submit to the halfhearted carrying out of preventive methods, or the refusal to do anything at all to interfere with the progress of a disease. I myself, when advising the proved and practicable remedies for a certain disease, have been met with the remark: "Don't you think that if I got rid "of this disease in my trees I should only get some other?" The mixture of ignorance, apathy and fatalism shown in this reply is, to say the least, not encouraging. Further, the plant therapeutist does not possess one of the chief weapons of the doctor and the "vet" against contagious and infectious diseases—isolation. Where it possible in the case of a rusted wheatfield, a cankered larch plantation, or a blighted potato crop to isolate the diseased plants and prevent them from contaminating their neighbours, the plant doctor and the farmer would have a far easier battle against theso diseases. The agriculturist is wont to complain that the number of diseases by which his crops are affected is so great; but comparing any species of cultivated plants with man, the horse, the dog, or other domestic animal, we do not find that the diseases suffered by them are less in number than those we deplore in our plants. Plant diseasos are on the increase—for very evident reasons. In the economy of Nature the intermingling of species of plants with others differing in structure, habits and inherent characters hinders the progress

and endangers the existence of the organisms which cause the largest proportion of our epidemics. The spread of such diseases among human beings, sparsely scattered over a wide area, is low. In closely-packed populations the prosperity of the organism causing the evil is most marked. But the multiplication of large areas of plants of the same kind destroys the natural equilibrium and increases the danger of epidemics. This danger calls for corresponding precautionary measures. A hundred years ago the conditions favourable to the rapid spread of a disease caused by insect, fungus or bacterium were very much less than at the present day. But our weapons for an intelligent fight against the attacks of these organisms were then of little use, and were wielded without confidence. We have now, as in human therapeutics, got past the "bleeding for all evils" stage, and our weapons are of no mean order. Man's power over the organisms which injure cultivated plants is immeasurably greater than it ever was before, and his knowledge of the plants themselves is equally extensive. Indeed in many ways the knowledge of plant pathology and therapeutics will bear comparision with that of human and veterinary medicine.

All efficient measures for the preservation of health whether carried out by individuals or communities rest upon exact knowledge of the causes of diseases and the effects they produce in their victims. It is a matter for congratulation that there are a host of instances of the accurate tracing, by observation, of the causes of many diseases of plants. This has been accompanied by experiment, and it needs no argument to convince anyone in the least acquainted with inductive science that experiment is as essential as observation. The science of plant pathology and therapeutics has its giants, whose brilliant work has gained valuable positions in the advance of knowledge. Medicine has its leaders like Hunter, Pasteur Simpson, Lister; and De Bary, Hartig, Tubeuf, Frank and others will be remembered as the pioneers in a science the importance of which, from an economic point of view, will by-and-by be as fully recognised as medicine or veterinary science. During the past fifteen years the discoveries made in combating insects and fungi which are parasitic on plants have made almost a revolution in agriculture, though this has not been so much felt in Britain as in other countries. The conservatism of the British armer is a very marked character and leads to great delay in accepting the lessons learnt outside his own sphere.

The general laws of sanitation in plants do not differ very much from those laid down for preventive medicine in man or animals. They include the removal and destruction by burning of dead plants, or dead parts of plants, suffering from communicable diseases, as soon as the outbreak is noticed and before it has widely spread; the prevention of conditions which favour infection; the isolation by means of trenches of plants whose roots are diseased; and the exclusion or quarantining of plants from infected countries. These are but examples of sanitary methods which should commend themselves to every practical man, and have been used with great success in numerous cases. They are, however, almost useless without an intelligent watching for the appearance of disease, such as every careful mother or shepherd exercises in the family or flock. It is not unusual to find a lack of observation in noticing the appearance of blights on crops, so that the evil is not considered until the fields are most markedly devastated. Observation, too does not always lead to intelligent action. The farmer who seeing "smut" in his wheat takes no measures, and attributes it to the prevalence of "the mule plant," is not a myth and may still be found in Britain. It is necessary, when sanitary laws are announced, that they should receive the support of those they are intended to benefit, and a belief in such rules must be inculcated in those engaged in cultivating plants.

The machinery for technical instruction in rural districts in England exists, and could be used (as is has been to a slight extent) for disseminating such doctrines. But the farmer will learn more by his eyes than by his ears. His own knowledge, which gives him what success he has in his art, has been gained by the use of his eyes, rarely by reading books or attending lectures. Demonstrations of the methods and results of plant sanitation, to which all agriculturists and horticulturists should be invited, should be carried out at local agricultural shows, at weekly markets and fairs, and at Colleges of agriculture. The interest the bee-keeping, dairy management and other demonstrations evoke at agricultural shows points to the fact that farmers are not averse to taking advantage of this, the best method of instruction. Landowners might arrange that demonstrations of spraying, fumigating, isolating by trenches and other operations should be shown at convenient places, where their tenants and others could come and see these things for themselves.

The science of plant pathology and physiology has opened a new epoch in agriculture, and British farmers should be alive to this fact. Let them not allow their competitors in other countries to profit at their expense by knowledge which they also might possess and which would enable them to get in advance of others by obtaining more from the soil, with less expenditure of time and money. It is difficult for those interested in these questions to avoid a tendency to "make "the flesh creep" by exaggerating the probable results of supineness in the matter, but it is unwise, because the Britisher—and the agriculturist not less than other classes—directly he hears any suspicion of the shriek of the enthusiast, assumes an antagonism without relation to the gospel of the preacher.

The conversion of the agriculturist and horticulturist to these beliefs is not an easy matter, even as the agitation against small pox, vaccination and muzzling for rabies shows to be the case with human and veterinary sanitation. A shorter and perhaps better way would be for those who control such affairs in the State to satisfy themselves—as has been done by foreign governments—of the importance of plant sanitation and of the confidence to be placed in means already used, and then to enforce their practice. The history of sanitation shows that the existence of knowledge and the promulgation of methods were of little use till the force of the law was called into make the carrying out of these methods obligatory. The mortality in human beings and domesticated animals would be far higher in Britain if the laws with regard to notification and treatment of cases of fevers, small-pox, pleuro-pneumonia in cattle, swine fever, etc., were not enforced. There is little doubt that if the Board of Agriculture initiated similar measures to protect crops, in a short time those benefited would recognise their value, just as has occurred in other countries. In America the National Government exercises a supervision and control in matters of quarantine and prevention of disease in plants, and expects each State to provide for the proper and timely application of the most approved remedial and preventive treatment when found necessary. The actual laws as to the suppression of diseases among cultivated plants are enacted and carried out by each State. These laws vary to some extent in the different States, but they are all accompanied by penalties—both fine and imprisonment—for neglect of orders to carry out the prescribed treatment. In Michigan any person who neglects to remove and destroy a diseased tree or fruit, after such examination and notification as is provided by the law, is guilty of a misdemeanour, and punished by a fine not exceeding one hundred dollars, or by imprisonment in the country jail for not exceeding three months, or both.

Such legislation in America has been in existence for nearly 20 years, and is extending with the exact

knowledge of the method of spread of parasitic diseases and with progress in agriculture. A permanent legislative committee was appointed some few years ago to watch over and control matters relating to plant diseases, and this committee is in touch with the various local authorities. This was the result of a "National Convention for the suppression of insect pests and plant diseases by Legislation," held at Washington in 1897, and attended by some fifty agricultural and scientific experts.

In Germany official notice is annually given of examination for particular parasites, and these orders are carried out through the police authorities. In some of our own colonies, notably Australia and Canada, equally strict laws exist. Queensland has fully recognised the value of State aid to agriculture by giving it the best scientific advise, and by the "Diseases of Plants Act, 1896," of that Colony after enacting that certain importations of plants from places where diseases of these plants are prevalent are prohibited, every nursery is required to be registered and regularly inspected by an officer duly authorised by the Minister for Agriculture. In the event of the nursery being diseased, the officer notifies the nurseryman to take the necessary measures for the eradication of the disease, specifying the required measures in clear and easily intelligible language. For example in the case of fruit-fly disease the instructions are:—"All fallen fruit of whatever kind, whether harbouring insects or not, shall be gathered at noon of each day, and all pest-infected fruit shall be submitted to the process of boiling or be buried beneath not less than 1 foot 6 inches of solid earth. The trees shall be sprayed with one of the following mixtures." (The methods of preparing the mixture and the number of and interval between the applications are given.) That in countries where personal freedom is so carefully guarded such laws should be passed and carried out without friction shows that the planters of these countries are awake to the value of these legal enactments.

There are difficulties in carrying out such laws, and it may be urged that the inspection would be costly and hard to carry out efficiently; but these difficulties have been met with and overcome in human and veterinary sanitation, and even in plant sanitation they are not proving at all insuperable in countries where the system has been in force for some years. It is said that in Britain we are not yet ripe for this kind of legislation, and that popular opinion would disapprove of measures interfering with the freedom of tea cultivator. But history shows us that such arguments have been adduced against sanitary reform in men and animals. The effective carrying out of health regulations and the economic benefits which result have been the best answer to these objections. The Board of Agriculture could by means of existing data easily satisfy itself and others that the cost of the introduction and administration of sanitary laws for plants was money well spent. A series of epidemics, causing great losses to farm crops and other plants, would no doubt produce a different feeling in the matter, but would it not be wiser to learn by experience already gained, and not wait for further lessons from this expensive though effective teacher?

Looked at from the point of view of insurance against possible losses, or as an investment which will ensure greater profits, plant sanitation should commend itself to the business man. It is the duty of those whose interests are at all affected by the prosperity of agriculture—a fairly extensive class—carefully to weigh the evidence in other countries and at home in favour of sanitary methods for plants, and having convinced themselves as to their practical value, to lose no opportunity of furthering the cause of *Planta sana in plantario sano*, by inculcating the aims and methods of plant sanitation, and where advisable taking means to obtain the support of the State. J. B. CARRUTHERS,

—*Contemporary Review* for May, 1902.

MODERN METHODS IN TOBACCO CULTURE.

BY A. M. HOWELL.

Perhaps I can entertain and assist the farmers of Victoria, in the columns of "The Australasian," by briefly outlining my experiences in the culture of tobacco. It may be proper that I should state, by way of introduction, that my training in the arts of growing and curing tobacco-leaf was acquired on the farm, in the Southern States of America, where I was born and reared, and where the choicest of "bright" aromatic tobaccoes are grown. It may be added that in later years I have given close attention and study to the principles involved in both growing and curing—the really scientific principles that come within the easy grasp to the common run of intelligent farmers, and this means no more nor less than the application of good commonsense, once you see the how and the why. These principles are few in number, but they are not to be trifled with if the grower is aiming at tobacco of good quality, that will bring the highest market price, wherever he may sell it. There are just a few important—it may be said absolutely important—points to be strictly and rigidly adhered to, and these are:—

THE MAIN QUESTIONS INVOLVED.

1. The selection of a suitable soil for the type of tobacco desired to be produced.
2. The selection of a suitable variety or varieties of tobacco, looking likewise to the class and type desired.
3. The cultivation of the crop, including the work of the plough and hoe, the prompt and diligent pruning of the plants, the extermination of insect pests, and all else that can be done to promote the fullest expansion of the leaf.
4. Preparations for curing and the harvesting of the crop at the proper stage of ripeness, looking to a uniform yield of ripe, mature leaf and to desirable colours.
5. The curing processes—the ultima thule of the tobacco-grower—how to produce bright and beautiful colours that at once captivate the tobacco manufacturer and command the highest market prices, and pay the producer a good round profit.
6. The care of the leaf after it is cured, which means its preservation in sound condition, and the fixing of the colour, which may be lost or faded or deepened into other shades by improper management.
7. Packing and marketing—in the local home market or abroad—with extreme care as to content of moisture and the possibility of dangerous absorption of moisture in the hold of the ship.

SUITABLE TOBACCO SOILS.

In growing tobacco there is nothing more important than the selection of a suitable soil. This matter is co-important with curing the leaf. With the most skilful curing that can be done the influences of the soil are inevitably present. Proper curing will, of course, make the best that is possible of any leaf, grown upon any soil, but upon the character of the soil the grower must depend for the raw material out of which to turn out excellent cured leaf of any given class or type. To grow the cigarette leaf, for instance, upon a dark, rich soil is impossible. Such leaf is produced on a sandy soil of only very moderate fertility, and cannot be produced upon any other with any degree of certainty. With a good season—a year of satisfactory rainfall—the certainty would be the reverse way—that fine cigarette goods would not be the yield from a very fertile soil. Granville county, in the state of North Carolina, is famous for its production of the finest types of bright tobacco, and they are grown upon poor sandy soils, so poor, indeed, that, to use an expression common in the vernacular of that region, they will barely "sprout cow peas." Soils of only medium fertility, containing a predominance of sand, are unquestionably best for

that general class of leaf required in Australia for pipe-smoking—classed in America as "manufacturing leaf." Well-handled leaf from such soils will contain a sufficiency of nicotine, will be of mediumly fine texture, will burn with freedom and with good flavour and aroma.

AVOID COMPACTED CLAYS

A hard, compacted, or tight, waxy clay subsoil should be avoided, especially if the top-soil or soil proper is shallow. Examine the roots of plants grown in such a soil, and it will be found that they have not reached any considerable depth, but have branched out laterally or have rebounded, so to speak, and appear crimpled and crumpled, with but little growth where they have come into contact with the impenetrable clay subsoil. It will be found also that such soils quickly dry out down to "hardpan" in seasons of drought. The hard subsoil may maintain a minimum of moisture, sufficient to keep the plants alive, but there will be poor growth, and the product small, short, ribby leaves. The reverse will be the case if the crop is grown in a fine, deep sand, or sandy loam and for reasons that are at once obvious to the practical farmer. Such soils hold moisture with greater tenacity. Water rises to the surface by capillary force much more slowly in such soils. Consequently, there is less evaporation from them. Such soils come nearer than any others to maintaining just the proper quantity or percentage of moisture that plants require. In seasons of drought they hold moisture longer than fine, impalpable clays or silts, and in season of excessive rain they quickly drain themselves to the proper limit, which is very important to the tobacco crop in the matter of texture of the leaf. Tobacco will not stand an excess of moisture to be of good texture and flavour. It will grow coarse, and heavy, and excessively gummy in a saturated soil, or one nearly so.

SOIL MOISTURE, AND SYMMETRICAL GROWTH

It is easy to see that in loose, friable soils, with subsoils of like texture, the roots of the plants easily reach to considerable depths and to the level of permanent moisture without encountering too much of it. Now just here we come to a question of supreme importance in growing good leaf, and that is the matter of continued uninterrupted growth. In the production of leaf of the best and uniform texture the growth of the plants must go on unchecked. In that case there is regularity and symmetry in cell growth and constant, measured expansion. The soil that is capable of storing and holding persistently a moderate percentage of water is the soil that will promote and maintain the regular growth just described. In such soil, with fairly good seasons, the soil being not very rich in nitrogen, but having a plentiful content of potash and lime, the leaf will reach a satisfactory width and length. In all cases, once a tobacco crop is planted, everything feasible should be done to accomplish the greatest possible expansion of the leaf. It may be noted here that the ribs and veins of a tobacco leaf never increase in number from the time it is first unfolded in the tiny plant in the bed, no matter to what size and length it may grow. Count them when the leaf is the size of a shilling coin, and again when it is 2ft. or 3ft. long, and it will be found that they are the same in number. Now the greater the expansion of the entire leaf the wider the spaces between the ribs, and the greater the proportion of parenchymatous matter—or ribless and veinless tobacco. In cigar tobacco, if of the proper texture, the greater will be the proportion of wrappers, as cigar-wrappers must come from the web of the leaf occupying the space between two lateral ribs. This maximum expansion is best promoted by a soil that maintains a proper percentage of moisture—about 40 per cent. of its water holding capacity—and no soil serves this purpose better than a fine, deep sand, or a sandy loam, with a friable, workable subsoil. In the American states the soils generally adopted by the most successful growers of fine tobacco are those above described, containing from 60 to 90 per cent. of fine sand. They are, in many cases, what geologists term transported soils or drift soils. Where the land is really too poor to produce leaf of sufficient size for the type wanted, farmyard or stable manure well rotted, is sparingly used, or, in its stead, commercial fertilisers, containing rather high proportions of the mineral elements such as potash and phosphate of lime. It is perhaps rare in Australia to find soils too poor in plant food to grow excellent tobacco. At least, I have found this to be the case in New South Wales, where I have had several years' experience in growing the weed.

DARK RICH SOILS UNSUITABLE.

The main objections to dark, rich soils, such as the silty, humic flats along the rivers and creeks, is that in seasons of generally satisfactory rainfall they overdo what the intelligent, ambitious tobacco-grower requires They produce what may be termed "too much of a good thing"—coarse, heavy leaf, with enormous ribs and veins, with too much gum, too much nicotine, rank, strong stuff, that is devoid of that delicacy of flavour and aroma that pleases the average smoker; and such tobacco has to be very considerably steamed and manipulated to get it to burn well in pipe or cigar if, indeed, it can be used at all for the later form of smoking goods. These dark, rich soils contain too much nitrogenous matter and that kind of plant foods tends to coarseness to large growth which however desirable in maize and some other farm crops, is modifiedly the reverse of what is wanted in a crop of tobacco.

REARING TOBACCO PLANTS.

As the season is at hand for sowing seed, perhaps a fitting conclusion to this contribution would be some suggestions on the production of plants. Tobacco seed should be sprouted before sowing. Fold the seed up in a dark wollen cloth, about three-ply, tie compactly with twine, and soak the packet in warm water for 12 or 15 hours. Sprout a well-rounded teaspoonful of seed for every ten square yards of bed which should produce a sufficient number of plants for two acres. When the packed of seed has been soaked in warm water for the time stated, put it in a closed tin or other similar vessel, and place in a warm situation, as near the kitchen stove, and keep warm and moist until the seeds show general sprouting. The bulk of seed should show quite a speckled or grey appearance with germinated seed before sowing. Have the bed ready—a rich, black soil is best for producing plants. To prepare the bed, dig and pulverise to the finest tilth to the depth of 12 in. to 18 in. use no manure. After the bed is fined and levelled, pile wood upon it plentifully, and burn it well, so that the soil is well cooked to the depth of 12 in. or 3 in. This process destroys all vestiges of insects, and the seeds of noxious grass and weeds and improves the texture of the soil. Again rake the bed well, and clean it of rubbish. The seed being ready, as above described, mix thoroughly with about half a bushel of moderately dry fine, sifted soil, adding sufficient ashes or cornmeal, or other white material to give the mass a bright appearance, so that it can be seen in contrast with the soil of the bed. Make sure that the seed and soil are very thoroughly mixed, by sifting through a fine sieve a number of times. Sow by hand lightly and evenly, never allowing handfuls to fall in a place. Make three or four sowings instead of sowing all at one going over. In this way an even and regular distribution of the seed will be accomplished. Sweep the bed very lightly with an ordinary house broom, dragging the broom rather than brushing. Water the bed freely at once with a fine-rosed sprinkler, slowly so that the water does not run on the surface and float the seed into heaps. Now cover the bed with the cloth called bessian, the cheaper, open quality, laying the cloth, flat upon the bed in contact with its entire surface, and pin it down securely on all sides. All future waterings, until the plants are well up, must be done upon this cloth, which takes the water readily and prevents it from flowing on the bed's surface and washing the seeds out of place. The seeds will "come up" better under this cloth, and more evenly,

than in the open air, especially if there is any wind. The tiny seedlings will appear in from two to four days, and the hessian may remain lying upon them for two or three days longer, or until the plants show signs of stretching—their stems lengthening out as they reach upward for more light. Stretching must not be permitted, as it greatly weakens the plants. The hessian must be raised about 3 in. or 4 in., resting on poles or cross-sticks for support. From this period on the bed of young plants should have a plenty of light and moisture, and should be covered only at night for protection from cold and frost, and during the heat of the day for protection from a very hot sun. To nourish and hasten the growth of plants liquid manure should be used—a very weak solution at first when the plants are young and tender, and of greater and greater strength as they grow larger and become more hardy. Very strong liquid manure should never be used, however. The beginner is apt to make it too strong. Good barnyard or stable manure, well rotted, is the proper material. Soak it in water, strain and dilute with water with judgment, being careful to err, if at all on the safe side by making the solution too weak rather than too strong.

PROTECT THE PLANTS.

Beds of tobacco plants should by all means be protected from the wind, especially dry, hot winds. So, protected they will grow much more rapidly and perfectly, and should become sufficiently developed for transplanting in about eight weeks from the time the seed is sown. For avoiding the wind there is no better plan than boxing in the bed with boards, and it is not a bad plan to have the bed in a pit its top about 12 in. or 18 in. below the surface, in which case care must be taken that water does not flow into it during heavy rains. In the woods far removed from the fields of cultivation, near a river or creek, is the best place for the plant-beds, looking to the avoidance of fungus diseases and destructive insects that may infest the farm premises, and to a constant supply of water.—*Australasian.*

THE FORMOSA TEA INDUSTRY.

Memorandum on the Tea Industry of the Island of Formosa.

BY THE BRITISH CONSUL AT AMOY.

The following notes have been drawn up from personal knowledge supplemented by information furnished by the Japanese authorities. Attached hereto will be found a pamphlet* issued by the Formosa Government which will be of interest, and will, it is hoped, assist to a clear understanding of the tea industry.

* The pamphlet may be seen by those interested at the Chamber of Commerce.

With regard to the Export of tea from this Island, the "season" does not coincide with the twelve months' returns from January to December of the Customs tables, and an extract has therefore been made (see below) for the sake of comparison from both the Customs returns and the Consular reports on the season's yield for the last five years and seasons, dating from 1897, when the Island was still suffering from the effects of disturbances consequent on the Japanese annexation.

Export of Tea, 1897-1901, extracted from the Japanese Customs Return.

Year.		Oolong.		Ponchong.		Total
		Quantity.	Value.	Quantity.	Value.	Value.
		lb.	£	lb.	£	£
1897	...	17,857,438	654,583	2,145,152	46,794	701,377
1898	...	17,422,631	569,684	2,704,185	52,673	622,357
1899	...	—	549,834	2,918,277	60,812	610,646
1900	...	—	496,103	3,303,497	67,038	563,141
1901	...	—	383,411	2,920,228	52,610	436,021

Return of Season's Yields 1897-1902 from Consular Reports.

Season.		Exported to Amoy.	Exported to Japan.	Total.
		Half-chests.	Half-chests.	Half-chests.
1897-1898	...	484,061	—	484,061
1898-1899	...	421,271	—	421,271
1899-1900	...	377,848	32,502	410,350
1900-1901	...	359,000	39,000	3[illegible]8,000
1901-1902	...	338,500	64,500	403,000

Especially worthy of notice, apart from the steady decrease, up to last year, in quantity and value of this Export, is the growing trade via Kelung to Kobe for further shipment to the United States at the expense of the Amoy trade during the last three seasons. The inclination of the Japanese authorities is naturally all for the development of the Export of this staple to their own country, and it receives every encouragement from them in that direction, in respect of harbour development at Kelung and by means of preferential duties or harbour dues. The Oolong teas are the final quality of teas produced here and are destined for the American and London markets, whilst the Ponchong tea, which is, both as regards manufacture and export, in Native Chinese hands, is sent for consumption to the mainland and the Straits Settlements. This latter tea is highly scented by means of the blossoms of certain fragrant flowers—among them being those of the gardinea, the Tchu-lan (aglaia odorata, Lour.) and Magni (Jasminum Sambac), but the Oolong teas are not dependent or any adventitious aid for their aroma. The following notes on the preparation of tea have to do solely with Oolong leaf. It will be understood that the leaf goes through two courses of preparation, one at the hands of the cultivator or planter, and the other by the tea-merchant at Twatutia (Jap. Daidotei) the local tea market and export centre, where the leaf purchased from the planter or broker undergoes another firing, and, after sorting, is put up in chests for shipment to Amoy or Kobe. It will be noticed that no kind of machinery is used in the manufacture, the entire process being carried out by hand with the aid of very primitive utensils, made principally of split bamboo in different forms, which, however, seem admirably adapted to the end desired. The wood used for chests is imported from the mainland ready cut into small pieces of standard size suitable for building up the boxes. The lead foil with which the boxes are lined is made by hand, being pressed when in a molten state between large tiles, and then cut to measure locally, the lead use for the purpose being imported in pig form from Australia. The districts under tea cultivation in this Island lie between Lat. 24°N. and Lat. 25°10'N., extending from Taichin and Shoka in the South, and Kelung and Kimpaoli in the North; the intervening country being one almost continuous stretch of hill and uplands. The parts most famous for tea are the hills and uplands on both banks of the Tokoham and Kelung rivers, whilst of these tracts the locality which yields the choicest leaf of the whole Island is Paichipo, the upland country around the eastern extremity of the Tokoham river.

The table below gives the names of the principal producing centres and the respective areas under tea-cultivation:—

Prices of all commodities and consequently of labour have risen year by year since the annexation of the Island to Japan. Rice in particular has gone up in value to an extraordinary degree, and great distress has generally been felt in consequence. The expense of such industries as the manufacture of tea have experienced an increase of fully 60 per cent in ten years, or an average of 6 per cent per annum. The following is an estimate of the expense entailed in the preliminary manufacture of tea for delivery to the tea-merchant; taking 100 catties of tea as the unit (1 catty = 1·33 lb.)

	£.	s.	d.
RENT (say)	0	10	5

Note.—Rent of one "Ko" (1956 sq. yds.) is gold yen 30, or £3 2s. 6*d*. A "Ko" bears 10,000 plants and produces 600 catties of raw tea

CULTIVATION (say)	0	6	0

Note.—The tea-gardens are tilled four times a year, in spring, Summer, Autumn and winter. For one "Ko" of garden 43 coolies are employed, their wages being 40 sen (10*d* a day including food, making a total of £ 1 15*s*.

PREPARATION OF TEA (say)	1	8	4

Note.—Subdivided as follows:—

	£.	s.	d.
Picking	0	12	6
Fuel	0	1	6
Charcoal	0	1	10
Labourers	0	4	6
Do. food ...	0	8	0

Total...£2 4 9

Over 100,000 persons are engaged in the production of tea in this Island, and it is said that in Twatutia alone those occupied in the business number over 10,000 males and females. Labourers in the districts given up to the cultivation of tea-gardens are all natives of Formosa, and in the intervals of tending the tea are all engaged in farming and agriculture.

With regard to the labour engaged in the final preparation of the tea, the shorters are all natives of this Island, but the remainder immigrate temporarily from the mainland of China as occasion requires. This custom is of long standing, and intending employers have to engage their men in advance, making the re-engagement at the close of each season when their employes returns to China. Their passage money is advanced to them, half the wages of the season is paid to them on account, and the balance is handed to them when they leave the Island. Rates ruling for labour are approximate as follows, when calculated by the month:—

	s.	d.
Tea-coolies in Twatutia	14	7
Tea-sorters (women and gir's) ...	9	5
Tea-garden labourers	15	8
Tea-cultivators	18	9

Wages paid to coolies by tea-merchants and farmers vary, but the above is a fair average. Wages paid by the merchants in Twatutia are given above as for the month, but they are as a rule estimated in the lump for the nine months or so of the season. Tea-sorters are paid by the day, and it is the general custom to supply coolies and sorters with food, at an average cost per head of about 6*s*. a month. Tea-gardens in Formosa are, as a rule, held by natives of the Island, who either rent uncultivated land from the owners, paying certain rates for fixed periods, and plant tea for their own profit; or rent a garden already planted. The former pay about 6*s*. a year for one "Ko" of untilled land, and the latter a rent of about £2 10*s*. the "Ko" per annum. As already stated there are two processes in the manufacture of tea; the preliminary preparation or curing by the planter and the final process carried out by the export-merchant. There are many methods practised by the cultivator in the first process, varying with the different districts, but the variation is unimportant. The successful production of Oolong tea depends greatly on the weather, and whether the season is favourable to the development of the leaf. The preliminary preparation of the leaf is, according to the season of the year, as follows:—

DISTRICT.	AREA.		NUMBER OF PLANTS.
	Acres.		Number.
Paichipo ...	274·81	...	6,300,000
Haisoanpo ...	601·36	...	14,879,600
Bunsoanpo ...	757·74	...	22,500,000
Sekiteito ...	1,473·87	..	36,470,000
Tokampo ...	2,249·60	...	62,890,000
Aachirifumpo ...	1,114·14	...	6,080,000
TOTAL......	6,471·52	...	149,119,600

SPRING TEAS.—The fresh picked leaf is first spread on a cotton cloth (No. 3, plate 10, of the pamphlet), and dried in the sun until it curls up. This is to assist fermentation, and takes about 20 or 30 minutes, the workman in the meantime turning it over once every five or six minutes. The moment when this process is complete is recognized by the smell, and the tea is then taken under shelter to finish curling which is carried out as follows:—A small quantity (about 1½ lb. or 2 lb.) is laid on flat round trays, made of split bamboo, arranged on shelves (No. 4, plate 10, and see plate 11), and the leaf is turned over at intervals of four or five minutes to let the air circulate freely, whilst it is rubbed between the hands to promote fermentation. Fine dry weather is required for this part of the process, as damp weather destroys the aroma. After the preparatory indoor drying has gone on for about two hours the leaf is emptied into larger trays (No. 6, plate 10, and see plate 11) holding some 30 to 40 lb. and turned over by hand for another two hours or so at intervals of about ten minutes or a quarter of an hour, the process being considered complete when the leaf shows reddish brown at the edges, and gives out a fragrant scent in place of the raw smell of the green leaf. It then undergoes a first firing. About 2½ lb. to 3 lb. or more of the leaf is placed in a shallow iron pan over a fire (No. 7, plate 10), after three or four minutes the leaf softens owing to the evaporation of its moisture, when it is removed to another pan and fired for another two or three minutes. (Some prefer to fire the tea for six or seven minutes in one pan only.) After this it is transferred to small split bamboo trays which are placed on the "hai-i" or rubbing-table, where the leaf is rubbed and pressed by hand for two or three minutes. The second firing, is much the same as the first, the only difference being that in the latter case the fire is not so hot as in the other. After the second firing, the leaf is poured out into a "toppin" or bamboo mat (No. 9, plate 10) and rubbed and pressed between the hands for some seven or eight minutes until the moisture comes out of it, which is a sign that this process is finished. The compressed leaf is then well separated by hand, and is put to the first drying, the method of which is as follows:—5 lb. or 6 lb. of live charcoal are put into the fire places (plate 12), and after the fumes have dissipated a "poelan" or bottomless round bamboo cylinder (plate 12) is set on the top, and on this rests a fine mesh sieve (No. 10, plate 10), holding about ½ lb. of the leaf at a time, where it is dried for one or two minutes. For the second drying the process is repeated. The leaf is then subjected to a third drying to complete the entire process before delivery to the merchant. In this last drying it is necessary to keep up a slow fire, and the fire is therefore banked up with ashes, the frame over it, and some 6¼ lb. of tea in the sieve which surmounts it; the leaf being turned over once in 10 minutes for 2½ to 3 hours. Owing to the cooler weather, raw leaf prepared for spring teas, takes a very long time in curling—and the liquor, appearance and aroma being all inferior the tea commands a low price.

SUMMER TEAS.—The process of preparation is identical with the foregoing, but owing to the difference of the temperature the time occupied in curling is shorter (see table below). The leaf prepared at this season is of the very best quality.

AUTUMN TEAS.—For time occupied in process of preparation see table. These teas are only inferior to the summer teas, with a good aroma, and find a ready market.

WINTER TEAS.—For time occupied in process of preparation see table. Tea prepared at this season is, for climatic reasons, inferior in aroma, and can be classed with the spring teas.

The table below gives the times for the steps of the preliminary preparation at the four different seasons of the year:—

	Spring Teas.	Summer Teas.	Autumn Teas.	Winter Teas.
	h. m.	h. m.	h. m.	h. m.
Sun-drying and curling ...	30	7	13	30
1st indoor ...	2 00	1 30	1 40	2 20
2nd do ...	2 00	1 30	2	2 10
1st Firing ...	5	5	5	5
1st Rubbing and Pressing ...	3	3	3	3
2nd Firing ...	4	4	4	4
2nd Rubbing and Pressing ...	4	4	4	4
1st Drying over Fire ...	2	2	2	2
2nd do do ...	2	2	2	2
3rd do do ...	3 00	2 30	3 00	3 00
Total...	7 50	5 57	7 13	8 20

Questions addressed to tea planters with regard to variation in quality of teas elicited the opinion that this depended greatly on the care and attention given to the four steps of turning over, drying, rubbing and firing. If the turning over is carried on for too long a period, the leaf becomes soft and loses its aroma. Especial care must also be taken that the leaf be turned over uniformly. If the pan-firing process is too quick it leaves a raw smell in the leaf, and if is too slow it dissipates the aroma. It is important that every part of the leaf should be brought into contact with the pan. If it is subjected to an insufficient rubbing the leaf will not curl. It is better to rub too much rather than too little as the rubbing and rolling have a great effect in producing a good scent. If the leaf is in sufficiently fire-dried it will not yield a good aroma, and owing to the moisture remaining in it will easily deteriorate in quality afterwards On the other hand if the fire-drying is too prolonged or the leaf is exposed to too much leaf heat, a poor aroma is the result. Great care has to be exercised therefore to insure a properly gradnated drying. Four catties (533 lb.) of raw leaf yield one catty of rough prepared tea: therefore, as 10,000 plants give 20 piculs (1 picul =100 catties) of raw leaf, the same number of plants will yield five piculs or 665 lb. of prepared tea. The final firing of the tea in the godowns of the merchant reduces the weight by another 10 or 15 per cent. The last process consists of sorting the tea by hand and sieve (see plates 13 and 14), when it is fired for some 12 hours, with an interval of cooling for one or two hours after 7, 8 or 6 hours' firing, and is then packed for shipment. The merchants are of opinion that the final firing is the crucial step of the whole process.

H.B.M. Consulate, R. de B. Layard.
Tamsui-Formosa, 19th May 1902. *Consul.*

AN ACCOUNT OF THE CULTIVATION AND MANUFACTURE OF FORMOSA TEA, PUBLISHED BY THE DEPARTMENT OF AGRICULTURE AND COMMERCE OF THE GOVERNMENT OF FORMOSA.

(*Translated from the French.*)

FORMOSA TEA.

In the North of Formosa between 21° and 25° 10 North Latitude, there stretches a district of from 160 to 170 kilometers in length and 80 to 120 kilometers in breadth, intersected everywhere by chains of mountains which occupy two-thirds of its surface. This tract of land, which is entirely cleared, is the centre of the production of the tea called "Oolong" whose quality is renowned. The numerous villages, which cover the valleys there, are inhabited by Tea Planters. For the most part these plantations are in terraces on clayey slopes which facilitate drainage; this advantageous position joined to a climate particularly favourable gives them a solid prosperity. The temperature does not rise above 28° centigrade (82° Fahrenheit) in the highest summer heat, never falling below 13° (55° Fahrenheit) in the depth of winter. The yearly rainfall is, 2000 m/m. The plantations are therefore exempted from an intense heat and a vigorous cold, which would both be injurious to their fertility. In this region, so privileged by nature, the cultivation of tea has succeeded in reaching an extraordinary extension, so much so, that the slopes and the valleys are entirely covered with this luxuriant vegetation. Of all the plantations the best known are those of Tokanpo, Haisoanpo, Chutenpo, Paichipo and Bunsoanpo situated on the upper course of the River Tamsui, in the valleys of Toakoham, Keelung and Shintiam.

The origin of tea cultivation in Formosa is obscure, but it is believed that the tea plant was imported thither from China, about 100 years ago.

At the commencement, the cultivation was limited only to a few unimportant plantations started on the outskirts of Taipel by some private individuals for their personal use; but from 1855, it began to develop, and from that date steadily extended year by year. At the sametime, owing to the choice of varieties of tea and to the improvement in the process of preparation, the yield and the quality of the product did not cease to improve, so that to-day the north of Formosa is endowed with an abundant wealth. Eight varieties of tea have been introduced there according to the soils that suit each of them. The different varieties cultivated reach a height varying between 0 meters 4 and 0 meters 7 or 8.

Generally the plants are obtained by sprigs. Transplanted, they begin to yield after 4 years, and from the 13th to the 16th year which follows their transplantation, they undergo a stump cutting. The picking of the leaves takes place 6 or 7 times during the year, from April to November. They pick only the young terminal leaves which are plucked by the hand, three at a time with the greatest care. The teas are known according to the season of the picking. There are the Spring, Summer, Autumn and Winter crops. The extent of the plantations varies from 100 square metres (about 1-40 th acre) to 300 square kilometers (74,114 acres). Their outturn is about 1,200 kilogrammes=(2645 lbs.) of green leaf per 10,000 square meters (2·471 acres)=1070 lb. per acre. The cultivation is simple and easy, the soil naturally fertile claims only four tillages during the year and it does not require any manure which, far from being useful, would deprive the tea of its characteristic flavour, as has been proved by experience. The tea of Formosa is prepared in two different methods, according to which it is either called "Tea Oolong" or "Tea Pawchong." "Oolong" Tea is of long standing in Formosa, but the production of Pawchong tea is rather recent. We shall now sum up briefly the Processes of Preparation of the two above-mentioned kinds of Tea.

OOLONG TEA.

The preparation is two-fold. The first which is but temporary is made at the Tea maker's. The second which is the final one, on the premises of the Tea merchant.

A. Temporary Preparation.

As the work is done by men's hands only and without any machinery, the result depends on cleverness, which is acquired only after years of practice; in fact it is a question of real art which is grasped by workmen of experience, who reach a perfection absolutely inimitable, and which entirely depends on the individual himself. This is the process of the Temporary Preparation of Tea:—The picked leaves are spread on a cloth called "Moa-po-tia" and put out to dry in the sun, in order to obtain a first softening. Then they are stored in a room, where they undergo a second softening, heaped up in "kalei," (a sort of frame or round board made out of bamboo strips interwoven) placed one over the other. Poured back into vases called "kamwo," they are submitted to a third and last softening, before being warmed in pots. The softening, having for its object to perfume the tea by the fermentation that it produces, is a delicate and important operation which requires from the workmen great cleverness. In order to obtain a good result from the three suc-

cessive operations, it is necessary to constantly observe the state of the weather and to take note of it. The heating in pots (a la marmite) is made at two different times. In this operation the difficulty is to get the necessary degree of heat. When out of the pots (marmite), the tea is dried at three different times in vases called "Poelan" with a fire carefully regulated. These are the diffe ent operations necessary to the temporary preparation of tea. It is said that this process requires altogether 7 h. 50 in Spring, 5 h. 54 in Summer, 7 h. 38 in Autumn, and 7 h. 13 in Winter. Whta is essential in the preparation of "Oolong tea" is to g ve to it first its perfume, then its flavour and colour which is seen when decocted. Its appearence, when dry, is a matter of less consideration. The preparation of "Oolong" tea consists then:—1. In a scrupulous care to be used in the softening and the desica ion. 2 In a careful examination of the prepared tea which is obtained through the proper and correct tests which every tea-planter and cultivator possess.

The ratio of the weight of the green leaf to that to which the preparation called "temporary" reduces it being 4 to 1, it follows that a plantation of 10,000 square meters will produce 300 kilogrammes of tea of "temporary preparation," if its yield in green leaf is 1,200 kilogrammes. The tea of "temporary preparation if its yield in green leaf is 1200 kilogrammes. The tea of "temporary preparation" is called "tea in bag," because the producers carry the same and deliver it in bags of the capacity of about 34 kilogrammes.

B. FINAL PREPARATION.

The tea merchants of Toa-Ko-Ham buy from the cultivators the temporarily prepared tea which then undergoes a second and last process in the manner following:—The leaf is passed through a perforated framework, being then thrashed with a winnow called "Shokalei." In this manner only the finest leaf remains. This is then put for 7 or 8 hours in an oven and warmed to the right temperature. This work finished, the tea is packed in cases. The second preparation reduces from 10 per cent to 15 per cent. the original quantity of tea which has been so treated, and the tea cases are of a square shape, in wood, fitting exactly to a doubt case in tin. The wood used for the manufacture of the outside case reminds one of "Cryptomeria," but it is harder and less elastic. Every year it is imported from Amoy. The dimensons of the cases are not uniform; some can contain 20 to 33 catties (27 to 44 lb.), others from 7½ to 15 catties (10 b. to 20 to lb). The large size is called a "half-chest" and the small a "box." Outside, all the cases are wrapped up with paper upon which are designed flowers, birds or personages, and which bear also the name of the tea merchants. Tea, after its second process, is commonly called "tea in case." "Oolong tea" holds the mean between black and green tea, from which it is distinguished by its delicious perfume and agreeable flavour. It has both refreshing and stimulating properties. It bears different marks which are generally used in the markets of Amoy and America as distinguishing the qualities:—

1st.	Choicest.	5th.	Superior.
2nd.	Choice.	6 h.	Good.
3rd.	Finest.	7th.	Fair.
4th.	Fine.	8th.	Common.

Although known in China since the olden times, the method of preparation of "Pawchong tea" was introduced into Formosa only 19 years ago. Its preparation consists of heaping up in a closed room "Oolong tea" mixed with fragrant flowers which impart to it their perfume. This heap is then dried and the flowers are finally removed. Tea so prepared yields a sweet taste and a peculiar smell. The flowers intended for this use are of four different kinds which give their name to the tea which they perfume. Pawchong tea is wrapped up in separate paper packets and packed in a case whose partitions are covered with tin foil just as in the case of Oolong tea. The outside is wrapped up with paper which bears a description of the contents, and the whole is covered with a bamboo mat. The cases are described as being of 1 nin (= 37 grammes and ½ of silver), of 2 nin or of 4 nin according to the quality of the merchandise they contain, although the capacity is equal to 20 catties (27 lbs.) for all the cases.

The export trade of Formosa tea owed its source to an attempt made by the Englishman J. Dodd, 31 years ago, with 5,000 lb. of tea which he forwarded to Amoy, and from there to the United States through the English firm of Messrs Tait & Co. From that date this branch of commerce made very quick progress. Formosa tea has surpassed in reputation all similar products of the Far East imported into the American market. It has attained the first rank amongst the articles of commerce in the Island, and its export has now reached the value of 6,000,000 yen per annum. The United States of North America are the most important buyers of Oolong tea. Nine-tenths of the whole export of Formosa tea go to their markets. A small quantity is exported to Canada and to England.

The cargoes intended for America come down the river Tamsui and arrive at the port of the same name, where they are transhipped aboard steamers and sent to Amoy and from there to New York *via* the Suez Canal. Eight or nine-tenths of Pawchong tea are forwarded to Java Borneo Sumatra and Australia: the remainder is sent to Annam Siam Singapore and to other parts of the Straits Settlements. The shipments intended for Australia go *via* Amoy and those for Annam and Singapore *via* Hongkong.

YEARLY COMPARATIVE STATEMENT OF QUANTITY AND VALUE OF "OOLONG" TEA EXPORTED

YEARS.	QUANTITIES.	VALUE.	AVERAGE VALUE BY 100 CATTLES.
	Catties.	Yen.	Yen.
1867 ..	293,000		
1868 ..	396,100		
1869 ..	546,900		
1870 ..	1,054,000		
1871 ..	1,486,800		
1872 ..	1,951,300		
1873 ..	1,560,900		
1874 ..	2,461,000	808,369,592	32,847
1875 ...	4,157,300	1,049,601,845	25,247
1876 ..	5,890,5[illegible]0	—	—
1877 ..	6,923,000	1,904,655,760	27,512
1878 ..	8 026,0 0	2,283,778,598	28,451
1879 ..	8,503 200	2,955,916,396	34,762
1880 ..	9,047,500	3 278,524.480	36 237
1881 ..	6 944,600	3 395 207.828	35,203
1882 ..	9,030,300	3,651,130,896	40.432
1883 ..	9.905,000	3,338,048.920	34,306
1884 ...	9,867,400	3,539,633,728	35,872
1885 ..	12,273,000	4,122,746,160	33,592
1886 ...	12,128.700	5,066 109,475	41,769
1887 ..	12 644,200	4,995,065,921	39.504
1888 ..	13,574,100	4,429,826,090	32,634
1889 .	13,070,800	4,366,901,996	33,409
1890 ..	12,862,900	4,688,475,600	36,449
1891 ..	13,573,300	4,126,891,200	30,400
1892 ..	13,671,700	4,443 364,870	32,573
1893 ..	16,394.900	6,167,761,380	37,620
1894 ..	15,400,300	6,144,719.700	39,900
1895 ...	13,399,8 0	5,991,171,210	44,760
1896 ...	15,923,500	5 851,022,000	36,744
1897 ..	13,448.700	6,458 850,000	48,025
1898 ..	13,073.300	5,696,842,000	43,576

DESTRUCTION OF INSECTS.

We have received from the *Academie des Sciences*, a brochure by M. M. Vermoral and Gastine on their latest experiments for the destruction of the *Pyrale*. Finding any pulverisations with liquid insecticides, soapy emulsions of nicotine petroleum, or pyrethrum, etc., useless, as these do not reach the insects wrapped up in the tender leaves by means of a web they weave for themselves, they tried arsenical solutions, salts of baryum, etc., in order to poison the leaves. But the wise creatures avoided these. Finally they had recourse to gas and toxic vapours, operating under conical metal bells, inside which increasing doses of gas were let out. But even these were unsatisfactory in their results. So they made an entirely new experiment with heated air. The pyrales, exposed to a hot vapour of a temperature of 48 to 50° centigrade, died in 3 or 4 minutes, They are killed at a much lower temperature (45 C.) if exposed for 10 minutes. Towards 40° C., they struggle and come out of their retreats, and the tender foliage is not destroyed at that temperature. The method of operation is further described. Metal bells were used and flexible tubes conveying watery vapour.

PLANTING AND PROGRESS IN THE FEDERATED MALAY STATES.

EXTRACTS FROM ANNUAL REPORT FOR THE YEAR 1901

By the Resident-General W. H. Treacher, C.M.G.

Mining.—As regards the chief industry, tin mining, while the average price of the metal for the year was lower than in 1900—$67.56 per pikul of 133⅓ lb (£108.15 per ton) against $74.15 (£132 per ton)—the output was :—

	Pikuls.	Tons.	Value.	
1900 ..	713,000	42,440	$52,800,000	£5,500,000
1901 ..	789,000	46,960	53,600,000	5,240,000

The out-turn approximated to that of 1896, which ranks next to 1895, in which year the largest record for the Federated Malay States was obtained, pikuls 825,000, the sterling price being £62 per ton only, or $32 a pikul. The labour force is returned, approximately, at 170,000 against 168,000 in 1900.

Tapioca cultvation is extending in Negri Sambilan and a condition attached to the alienation of fresh land for this product is that the planter must introduce some "permanent" form of cultivation, such as coconuts or rubher. Tapioca cultivation has been commenced in Pahang and will be encouraged. In Perak, especially, a considerable area of native-owned land is planted up with fruit trees. There is a ready sale for fruit to the miners, the trees require or receive little attention, and this fact indisposes the native to the more arduous labour of paddy cultivation.

The total forest revenue for the year under review was $287,542 and the expenditure $97,789. For 1899 the receipts were $212,730, and for 1900 $242,936. The estimated revenue for the present year is $260,000. It must he recollected that since the commencement of 1901 the collection of gutta percha *Palaquium* has been prohibited. The department is now *inter alia* energetically engaged in continuing to search for and reserve tracts known to contain palaqnium trees, in planting up and supplying from nurseries, and in facilitating the growth of self-planted trees in the palaqulum reserves. It has been found necessary to close, to a great extent, the mangrove (fire-wood producing) forests in Perak, which prove to have been over-exploited, These forests are being examined, surveyed and reserved. In due course working plans will bo framed and the forests will bo worked and become a source of considerable revenue.

Government Railways.—Open Lines.—The mileage open for traffic at the end of the year was 244½ miles (Perak 147, Selangor 97) as compared with 234 miles in the previous year. The nett revenue was $1,079,118, showing an increase of $43,750 over the results of the year 1900. The gross earnings were $2,240,822, and the gross expenditure $1,261,704. The proportion of working expenses to gross receipts was 53·90 per cent. as compared with 50·41 per cent. The worst percentages were shown by the new Province Wellesley section 91·77 and the new Larut and Krian section 91·94.

The Railway capital account of open lines is given as :—

Perak	..	..	$10,637,387
Selangor	..	..	7,896,624
			$18,534,011

and the return earned thereon during the year was 5·82 per cent, being for Perak 4·72 and for Selangor 7·30 per cent. The average cost per mile of construction and equipment of open lines to the close of 1901 is reported to have heen $75,754—this includes the cost of constructing wharves, piers, buildings, sidings and the purchase of land at six ports, the expenditure at Port Swettenham alone amounting to $1,108,791. The new rates and fares referred to in my last report came into force during the year. The present rates are said to compare favourably with those charged on the Ceylon Government Railway, though the cost of maintenance and working is higher than in that Colony. The figures of capital account above given do not include the large sums assigned for the extensions in hand.

Construction.—The estimate for the cost of the 179 miles of extension, the construction of which was commenced in 1896, put by the revised estimates of December, 1900, at $16,472,982 has been raised by $389,778 so that the estimated cost per mile is $100,380. Of these 179 miles there were open to traffic at the end of the year 82 miles. The total expenditure on the extensions up to 31st December, 1901, is given at $14,103,743, all furnished by current revenue of the States.

Towards the close of the year arrangements were made for the engagement of a party of surveyors from Australia for the survey of the proposed extension from Seremban (Negri Sembilan) through Kuala Pilah to Kuala Gemas, on the Johore boundary—some 54 miles, A provision of $87,000 has been made for this survey, which is now in hand. With the completion of the extension to Kuala Gemas there will remain only the State of Johore to be traversed say 120 miles, to complete the line from Penang to Singapore. From Kuala Pilah will probably be the most accessible route for railway extension from the main west coast line into Pahang.

Administration.—A General Manager of the Federated Malay States Railways was appointed during the year—a long-needed step in the right direction. The appointment was conferred upon Mr C Edwin Spooner, lately State Engineer, Selangor, from whose annual report I have gathered the information summarised in these pages. Mr Spooner was transferred to the service of Selangor from that of Ceylon in 1891, and among other works carried out the Kuala Lumpur Water Supply, erected the admirable block of Government Offices, Kuala Lumpur, and engineered the fine road over the Semangko Pass from Selangor into Pahang.

Public Works.—The total expenditure on Public Works, exclusive of the cost of establishments was $3,600,000.

Irrigation : Krian (Perak).—This scheme was commenced in 1899. Owing to difficulties experienced in procuring labour and to the unhealthy nature of the work, the scheme is not likely to be completed before the close of 1904. Approximately 100 square miles of paddy land will be served by the works The headworks will impound some 7,256,000,000 gallons of water in a sheet of water covering 10 square miles. The main canal is 15 miles in length and there will be 20 miles of branch canals, and, in addition, a large number of distributaries. The main canal will be capable of carrying 650 cubic feet of water per second. The scheme will supply water for domestic purposes as well as for crop irrigation and will act as a complete system of drainage in seasons when the rainfall may be excessive. The estimated cost is over $900,000.

THE CAUVERY FALLS ELECTRIC POWER INSTALLATION.

Despite a hitch in the line arrangements, leading to a breakdown at the start, the Cauvery Falls scheme promises well. The Falls are ninety miles from the Kolar Gold-Field, on which not only is coal dear, but the scanty supply of water is another difficulty. Although not the longest electric transmission line in the world, there being one of 135 miles length in the United States, the successful operation of the plant is a very important and interesting event. The contract with the Mysore Government provides for the supply of 4,000 horse-power to the various mines under Messrs John Taylor and Sons' management with the option of additional power to the same extent later. It was estimated that the first 4,000 horse-power would cost the Mysore Government £300,000 to provide, while the provision for doubling the power if required by the mines, as no doubt it will be eventually, will entail the duplication of the plant, involving altogether a cost of some half-million sterling. The agreement with Government is for ten years, for the first of which £29 per horse-power is to be charged per annum to the companies; for the second, third and fourth years £18 per annum and for the fifth year not exceeding £24 per annum. By that time it is estimated that the Mysore Government will have recouped a good part of the expense it has been put to and for the remaining five years of the contracts the companies are only to be charged £10 per horse-power per annum. The Chairman of the Mysore Gold Mine, rather more than a year ago, gave the average cost of working by steam as £30 per horse power per annum, so that the advantage to the mining industry, apart from the important question of saving water, is obvious.—*Railways*, Aug. 13.

"IMPERIAL DEPARTMENT OF AGRICULTURE" FOR THE WEST INDIES.

From Dr. Morris we have received copies of; Reports on the Botanic Station, Agricultural School and Land Settlement Scheme, St. Vincent, 1901. Report on the Experiment Stations at Monserrat, 1900-1901. Reports on the Botanic Stations and Agricultural School, Dominica, 1900-1901. The Reports shew that good work is being done, especially in Dominica. Here are two interesting paragraphs referring to the last-mentioned Colony:—

African Rubber *(Funtumia elastica)*: The trees continue to make progress. Should the yield and quality of rubber prove good under the condition in which the plants are growing, this tree will have proved itself hardy and worthy of cultivation in the West Indies.

Central American Rubber *(Castilloa elastica)*:—Five of the largest trees (over eight years old) are now ready for tapping experiments A second batch of these plants are growing well in another part of the station. When young this plant requires as much shade and attention as cacao. At this stage it is also liable to attacks of a 'white blight.' In Tobago this tree is being used experimentally as shade for cacao. That it may be cultivated side by side with cacao may be seen at this station where cacao trees, within a few feet of it and under its shade, continue in health and bear good crops.

THE RUBBER FAMINE.

To the Editor of the *India-Rubber and Gutta-Percha Journal.*

Dear Sir,—Your correspondent who writes about "The Rubber Famine" appears to have as much knowledge of the subject as a cow has of playing the flute. How can any sane man talk about a "famine," whilst the imports into Liverpool *alone* are about six thousand tons yearly, to say nothing of the supplies received in Hamburg, Antwerp, and elsewhere? The supply is practically as inexhaustible as the sands on the seashore, and even if millions of rubber trees are ruthlessly slaughtered, others go on growing behind them as rapidly as the weeds in the back garden. There are, of course, fluctuations in the supply from certain districts, and difficulties in the way of collection and transport, but the supply is unlimited, and exports will certainly increase just as they have done steadily from Para, whence the output when I first knew the trade was only eight thousand tons yearly, but has now increased from 21,640 tons in 1896 to 27,730 tons last season. Nivloc.

—*India-Rubber and Gutta-Percha Trades' Journal*, July 21.

A PROPOSED NEW INDUSTRY IN NEW ZEALAND: PAPER.

The Government has sent to London a number of samples of New Zealand timber, in order that these may be thoroughly tested, with the view of having it decided whether it is possible to start the paper-making industry in this colony. Sir J G Ward, in mentioning this circumstance to the saw millers' deputation on Monday, said that one of the daily newspapers in Australia required as much paper in twelve months as could be made from timber dealt with by any sawmill in this colony in that period; and if an industry of that kind could be started here, it would result in great benefit generally.—*New Zealand Mail*, July 16.

DEATH BY POISONING.

EATING A TUBER OF "GLORIOSA SUPERBA."

A Dolosbage correspondent writing on August 19th, reports:—

"The *Gloriosa Superba* is in full blossom just now, and an inquest was held this morning on a Kangany's wife at Pen-y-lan who tasted one of its deadly tubers."

Trimen says nothing about poison:—

"G. superba, Niyangala, *S* Karttikaikilanku, Ventonti, *T*. Rootstock of arched, solid, fleshy, white,

cylindric corms, 6—12 in. long, and 1—1½ in. diam., pointed at each end, bifurcately branched (or V-shaped), producing a new joint at the end of each branch; Low country, in bushy places; common. Fl. Sept.-Jan.; at first greenish, passing through yellow, orange, and scarlet to crimson from base to apex. Throughout India and in Burma, Malay, Cochin-China, and Trop. Africa. The character of the corms given above is from a note by Dr. Trimen, who further says that they are slightly acrid."

But Dr. Geo. Watt gives fuller information:—

Habitat.—.—A large scandent herb, grasping by the tips of its leaves; found in the forest of India, Burma, and Ceylon, ascending to 6,000 feet. It produces a large and very handsome flower, during the rain.

"Medicine.—The root is supposed by Hindu and Muhammadan physicians to have valuable medicinal properties. Dutt writes, 'It constituted one of the seven minor poisons of Sanskrit writers and had for one of its synonyms '*garbhaghatini*,' or 'the Drug that causes abortion,' but I am not aware of its being used as an abortive for criminal purposes. The tuberous root, powdered and reduced to a paste, is applied to the navel, suprapubic region, and vagina, with the object of promoting labour. In retained placenta a paste of the root is applied to the palms and soles, while powdered Nigella seeds and long pepper are given internally with wine.' Early English writers on Indian botany and materia medica speak of it as a violent poison, but none furnish satisfactory details of a case in which marked ill-effects were produced by its use. It seems highly probable that these ill-effects have been greatly over-estimated, an assumption which is confirmed by experiments recently conducted by Moodeen Sheriff. In a special opinion kindly furnished to the editor he writes: 'The root is not so poisonous as is generally supposed. I have taken it myself in small quantities, gradually increasing the dose to 15 grains. There were no bad effects, but on the contrary my appetite improved, and I felt distinctly more active and stronger. I have been using it in my practice during the last sixteen or seventeen years, and consider it to be a pretty good tonic and stomachic. Dose from 5 to 12 grains three times daily.' In Bombay it is supposed to be an anthelmintic, and is accordingly frequently administered to cattle affected by worms. In Madras it is believed to be specific against the bites of poisonous snakes, and the stings of scorpions, and is also used as an external application in parasitical affections of the skin. Surgeon-Major Thomson, C.I.E., has kindly furnished the following information regarding its utilisation in Madras:—'There are two varieties of this plant. The root of one plant divides dichotomously, that of the other does not divide at all but appears as a single piece shooting into the ground. The former is supposed by the natives to be the male plant, the latter the female. The male root is gathered during the flowering season, cut up in thin slices and soaked in butter-milk to which a little salt is added. In this composition it is soaked by night and dried by day for four or five days. It is eventually dried well and preserved. By this process its poisonous properties are said to be removed. When so prepared, and administered by giving apiece or two internally in a case of cobra bite, it is said to be an effectual antidote in cobra poisoning. It is called in Tamil '*Katharum cheddy*.' In scorpion and centipede stings and bites relief is obtained from the pain by applying a paste of the root rubbed up with cold water and then warming the part affected ovor the fire. This paste is applied also for parasitic affections of the skin."

"Notwithstanding its characteristic appearance, the tuber is occasionally employed by natives as an adulterant of the roots of Aconitum ferox, to which, indeed, they believe it to be closely allied in therapeutical properties.

"Physical Characters and Chemical Composition.—The root flattened or cylindrical, sometimes much pointed at both ends, sometimes consisting of two tubers uniting at right angles. On the upper surface may be seen a circular scar marking the point of origin of the stem, and on the under-surface beneath this another mark to which thin small rootless are frequently left attached. Covering the tubers is a thin loose, and wrinkled epidermis of a brownish-gray or pale-brown colour and on removing this skin, a brown or dark-brown surface is exposed. On cutting the tuber it is found to be dull-white and farinaceous internally. The taste is faintly bitter, the odour slightly acrid. A chemical examination by Dr. Warden resulted in the separation of two resins and a bitter principle, *superbine*, which the analyst considered closely allied to, if not identical with, that of Scilla maritima (*Dymock*)."

The case of this death in Dolosbage should be made the occasion of a careful enquiry and report for future guidance and protection.

CURING TOBACCO LEAF.

Some twenty years ago Mr. Cabanis, who had had experience in Cuba in planting tobacco, took exception, as a correspondent writing to us from Fort Stedman does, to the faulty methods adopted by the people of the country in curing their tobacco. He pointed out that sun-dried tobacco is never so palatable to smokers as that dried under cover. No doubt the latter method is not so easy nor so speedy as simply putting the leaf in the sun, The Shans apparently leave their tobacco alternately in the sun's heat and the night's dews with a result the reverse of pleasing. The correspondent says they are quite willing to learn a new method if there were only someone to teach them. Perhaps if the railway were made through the Shan States and the Shans were certain of securing a good price for all they can grow over and above their own requirements, there would be an improvement. The best tobacco-growing lands at present are at places distant from the railway, and perhaps that is one reason that so little care or trouble is taken by the cultivators in the important part of curing the leaf.—*Rangoon Gazette*, Aug 11.

RUBBER IN LOWER BURMA.

In the India rubber plantation at Mergui which is progressing favourably, the Government will in a few years have a highly remunerative return on the capital invested, beside the advantage to be derived from having introduced a new industry into Lower Burma. The extraction of rubber is said to be one of the simplest crafts in the world, which can be easily learned by the most ignorant. Kachins work it in the wild country between Upper Burma and India and equally wild and savage Indians in the Bolivian and Peruvian forests. A workman in the latter country usually taps from 75 to 159 trees a day, depending on his industry and the nature of the ground. A small incision is made in the bark and a tin cup attached to catch the sap. This is smoked and coagulated in the evening over a wooden fire which makes it hard, cured rubber. A collector gets from seven to twenty-one pounds of this rubber daily. The cost there comes to about 1s 4d per pound whilst the London price is from 4s to 4s 6d. The demand for rubber is increasing yearly, so that there would seem to be a bright future before the rubber industry in Lower Burma.—*Rangoon Gazette*, Aug 11.

REALIZATION OF FLOWERS.

TO THE EDITOR OF THE "TIMES."

Sir,—In *The Times* of Friday, July 11, you broach a subject of quite as much interest to agriculturists as to botanists, in reviewing "The Primrose and Darwinism." Whilst botanists are quibbling over small matters, fortunately for agriculturists there are men, who have no learned degrees, who for years have devoted their time to the subject of cross-fertilization, and turned it to practical account for the benefit of others. The Laxtons with the pea and the strawberry; Findlay in the development of the potato; and Garton in the cross-breeding of almost all farm plants, have done more good to British farming than has ever been effected by narrow laboratory tests, carried out without a definite object of practical utility. Whilst it has been generally accepted that grass such as the rye-grass and fescues could not be made to interbreed, Mr Garton has broken down the non-affinity of these varieties, and in his experimental grounds at Newton-le-Willows a large number of new cross-breeds of these may be seen growing at the present time. Oats which rarely produce more than two or three grains in a spikelet, except in a Chinese weed oat-grass which produces five, have been made to produce seventeen and any number from that down to two, and all with permanently fixed character. The kohl-rabi has been successfully crossed with the common swede; in fact, as a result of twenty years' unremitting work in cross-breeding, in the experimental grounds, there are at this moment tens of thousands of plants which shew variation to permit selection to establish a new and distinct breed from any one of them. As they are open to inspection this can be put to proof by any one interested.

In respect to insect-pollination, Mr Garton's observations go to show that Darwin far overstated the case. He has found that fertilisation occurs, at any rate among farm plants, at a much earlier period than is usually supposed, and certainly earlier than text-books suggest. So early is this performed that when insects enter self-pollinating plants, attracted by the colour or in search of nectar, fertilisation is completed; and his inference is that nectar is an after-product of fertilisation just as he has shown by his micro-photographs that an immediate result of fertilisation is the filling of the lodicules with moisture to ever open the glumes (at the base of which they are placed) to allow of the exit of the anthers, which, having performed their part of shedding pollen on the stigmatic surface, are no longer required. At this season, when the cereals are "in flower," an opportunity is afforded to anyone to test what he has so definitely shown, that when the anthers appear outside the glumes fertilisation has occurred some days.

Health has not permitted Mr Garton to publish a scientific account of his work, but when it does many of the points raised in your review will be cleared up. I have troubled you with this because, just at this season, the experimental grounds at Newton-le-Willows give too many proofs which botanists should not fail to see; and from the courtesy with which Mr Garton has shown his micro photographs to me and to others, I feel sure he would extend the same privilege to any who may be deeply interested in one of the most important matters relating to agricultural prosperity.

I am, Sir, your obedient servant,

W J. Malden, Principal, the Colonial College, Hollesley Bay.—London *Times*, July 25.

ARTIFICIAL RIPENING OF PLANTAINS.

The forcing to ripen of this delectable article of the table, to which a correspondent lately drew attention in your columns, is a practice for which the grower, and not the dealer, of the commodity is primarily responsible. In the Pulneys, where an enormous trade in plantains is carried on with the plains, the Hill ryot depends mainly, if not entirely, for his bare sustenance, on the sale of his fruit at the weekly markets in the lowcountry, and therefore it is not surprising he should resort to artificial methods for bringing the fruit to maturity. Beyond robbing the fruit of its freshness and flavour (for who has not relished a plantain ripened on the tree?) this "blowing" of the half green fruit, as the practice is termed among the fruiterers, has not been discovered to produce deleterious effects on the consumers. That the trade in plantains has, of late years, assumed vast proportions in the Lower Pulney Hills, will be patent even to a casual observer. After the wholesale destruction of the coffee, as the result of disease, the Hill ryots planted up the lands lately occupied by coffee, with plantains; and, in the long run, they found the latter more paying. The result is that almost every new grant, under the Darkast Assignment Rules, is cultivated with plantains. The comparative ease and rapidity with which this crop is grown in an eminently fertile soil, and the permanency of a crop once sown, added to the luxuriant yield in all seasons of the year, make the plantain the backbone as it were of the Hill population, who, but for that, would be reduced to dire straits. In fact, it is the growing of plantains that alone enables them to keep the pot boiling, and to meet their Government dues. Coffee and cardamoms do not pay, except the very large investors, owing to the depression in these industries of late. It is therefore but fair to say that any restrictions placed on the hitherto free grants of Government lands, under the Dharkast Rules, would be productive of incalculable harm to the smaller ryot, as it would be literally taking away the food from his mouth. No one, who has some acquaintance of the conditions of the Hill ryot and his humble aspirations, will accuse him of land-grabbing. His lot is already a hard one, and it will be made infinitely worse if undue restrictions are introduced on the easy and inexpensive methods, heretofore in vogue, of acquiring land on permanent *putta*. Of the numerous variety of Hill plantains and degree of excellence of each, a good deal may be written; but the most delicious and, at the same time, least harmful is the tiny *Navaram*, a fruit about 2½ to 3 inches in length, with a thin rind, and of a most delicate flavour and sweetness. The Hill people attribute curative qualities to this species of plantain. The huge red plantain, which attains perfection on the Hills and is noted for its succulence and richness, is the largest of the Hill plantains one would suffice for a meal. C. J. Stracey.

—*M. Mail*, Aug. 20.

ARTESIAN SPRINGS AND THE AUSTRALIAN DROUGHT.

With regard to the phenomenal outbreak of springs in various parts of New South Wales during the drought, Professor David, of the Sydney University, explains that it is due to the fact that after long spells of drought water-bearing rocks become very much desiccated, so that they contract, and in the process of contraction cracks are formed, which admit of subterranean water, which was previously hermetically sealed, finding an outlet for itself at the surface. The water coming from them, he states, might flow for weeks or months, but it was not likely they would prove such a lasting source of supply as do artesian wells, for, if the water was present in such a large volume, it would in all probability force a much bigger outlet for itself. Then rain comes, the earth is soaked, and the cracks close again; so the springs, he adds, cease to flow. The outbreak of such springs after a long drought are by no means rare.—*Melbourne Leader*, June 14.

BOTANIC STATION, TOBACCO.

This station was started in June 1899 at Dealfair, a valley situated opposite the landing place at Scarborough. The site was selected in 1898 by the Imperial Commissioner of Agriculture and the Superintendent of the Royal Botanic Gardens of Trinidad. The soil is fairly good and there is a regular supply of water from a small spring on the land. The first year's work consisted of clearing and preparing the land, making roads, paths and drains, and starting a nursery. The latter in 1899 contained 1,600 economic plants. In 1899 and 1900 the laying out of the Station was greatly advanced. In the latter year the nursery was increased to 7,500 economic plants, of which 2,157 were sold, bringing in an income of £15 7s 3d. A large number of cacao and other plants were distributed free to settlers on Crown lands and others. Latterly, a house for the Curator, an office and a shelter for visitors have been provided. Also a new entrance rendering the Gardens accessible from the landing place.

Attached to the Station is a travelling Agricultural Instructor whose chief duty it is to visit the holdings on Crown lands, and advise and assist the settlers. About five hundred acres are estimated to be now in course of being planted by cacao trees. The Agricultural Instructor also assists generally in promoting industries in the land.

The Station is mainly supported from the funds of the Imperial Department of Agriculture but the grant is supplemented, to some extent, by the Government of Trinidad. The Curator and the Agricultural Instructor are departmentally under the Superintendent of the Royal Botanic Gardens at Trinidad. The Station is occasionally visited and inspected by the Imperial Commissioner of Agriculture.—*Barbados Agricultural News*.

PLANTING IN COORG.

A beginning has been made in growing crops other than coffee. In two cases sugarcane has been grown, and ginger and saffron also in another, while elsewhere some attention has been paid to the cultivation of vanilla. The flowers of this plant, as is well-known, have to be artificially fertilised. This has been successfully accomplished in the case referred to with the aid of the humble Kurumber who has shown himself a very apt pupil and works most intelligently at the operation.—*Madras Mail*, Aug. 18.

PRODUCTS OF PARAGUAY.

The present important industries of Paraguay are the growing of Paraguay tea, maize, tobacco, oranges, beans and mandioc. The cattle industry is very large and exports of beef and hides extensive. Paraguay has immense forests of hard and soft timber, and an abundance of iron, marble, pyrites, copper and kaolin. The decree does not specify the amount, but authorises the necessary expenses for a proper exhibit of the country's resources and industries.—*Official.*

PLANTING AND R. B. GARDENS ON THE NILGIRIS.

From the Annual Administration Report (190-12) of the Government Botanic Gardens and Parks, the Nilgiris by R L Proudlock, Curator, we make the following extracts:—

Strobilanthes gossypinus, T Anders, flowered at the end of 1901, and it was a beautiful sight to see this shrub when it was in full flower, covered with bluish purple flowers; it is now ripening its seeds. The Curator has never seen this species in flower before. Most of the species of Strobilanthes flowers, as a rule, only once and then die.

The oldest tree of *Araucaria Bidwillii*, Hook, which is situated immediately below, and in front of the quarters of His Excellency the Governor's Medical officer, in the gardens, produced matured seeds during the year for the first time. Eleven seeds were sown on the 8th July 1901, and they have all germinated. The seedlings are still small, but are healthy and promising. This tree was planted in or about 1867 —*vide* paragraph 38 of the garden report for 1878-9.

A good deal of planting was done during the monsoon as usual. A number of plants of *Widdringtonia Whytei* Rendle, were planted in a ravine above the overseer', quarters, and also on the side of the ravine above Government House.

Seeds of a fine species of Phœnix (*Phœnix Canariensis*, Hort. were received from Sir George King, K.C.I.E., San Remo, Italy, on the 14th May 1901, and a good number of seedlings has been raised from them. Sir George King states that this is a very ornamental species of Phœnix which is commonly seen in gardens on the Riviera, and he thinks it would be likely to grow in Ootacamund and Coonoor.

A one-ounce packet of seed of *Paspalum dilatatum*, Poir, a grass which has received much praise in the newspapers during the last few years as a drought-resisting fodder plant, was received from Mr John Cameron, F.L.S., Superintendent, Government Gardens and Parks in Mysore, on the 23rd July 1901. The seed was sown on the 25th idem and germinated well. The seedlings were planted in trial plots at Ootacamund, at Sims' Park on the 28th October, and at Burliar on the 17th December 1901. The plants are dwarf in Ootacamund, while at Coonoor and Burliar they have grown well, flowered and seeded.

The following are a few notes on, and measurements taken of, a few of the species of economic importanoe recently planted in Burliar:—

Name of species.	Height.	Girth at 4 feet from the ground.
The Durian	6 ft 10 in	Not taken.
Durrio zibethinus Murr *a*	10 „ 9½ „	4¼ in
Camphor	7 „ 9 „	Not taken.
Cinnamon Camphora, Nees and Eberm *b*	12 „ 4 „	6 in.
Avocado Pear	15 „ 10 „	8 „
Persea gratissima, Gaertn *c*		
Para rubber	18 „ 8 „	Not taken.
Hevea brasiliensis, Muell. Arg *d* ..	21 „ 9 „	8½ in.
Do do *e* ..	29 „ 0 „	6⅝ „
Central American rubber	12 „ 0 „	Not taken.
Castilloa elastica, Cervy *f*	18 „ 10 „	1 ft 5⅛ in
Kickxia Africana,	8 „ 10 „	Not taken.
Benth *g*	17 „ 10 „	0 ft 7½ in
Kallar variety of Ceara Rubber	22 „ 6 „	0 „ 9¾ „
Manihot Glaziovii, Muell. Arg. *h* ...	23 „ 5 „	1 „ 4 in

In order to give effect to the proposal and suggestion made in paragraph 50 of last year's report, to collect and plant in order in Burliar or elsewhere the progeny of the best rubber-yielding trees which are discovered in other plantations from time to time with a view to comparing their relative merits, nine pits, 26½ feet, apart in one line, parallel to, and 30 feet distant from, the last line of Castilloa were planted with cuttings on the 9th February 1902 and with seeds on the 6th Maroh 1902, taken from the best rubber-yielding tree yet found at Bekki Kolley, Wynaad. It may be mentioned that this particular tree, which girthed 3 feet 3 inches at 2½ feet from the ground, yielded 14 ounces of dry rubber after one tapping, which was made on the 30th Jan. 1902. Adjacent to the line planted with the Bekki Kolley variety is a line of eight pits, 26½ feet apart, planted on the 23rd February 1902, with both seeds and cuttings of the Kullar variety. The yield of rubber from the parent tree (now dead) was never accurately determined, but it was known to be good.

Mr H G Parsons of Beechlands, Polibetta South Coorg, in his letter, dated 25th January 1902, to the Curator, states that he possesses a ceara rubber tree "20 years old, that is yielding 10 lb of rubber per annum," and he further states, "I have no other trees that in any way come near such a yield and some give next to no latex." Mr Parsons has quite recently sent here a few seeds from his best tree and has also promised to send a few cuttings of it. The seeds have been sown, and should they germinate it is intended to plant a third line at Burliyar with the seedlings. Should this variety prove in due course to be a better rubber-yielder than the Bekki Kolley and Kullar varieties, a distinct advance will have been made in the work of selection which has been undertaken.

On the cleared area which is free of mahoganies the following species of rubber-yielding plants have been planted, 30 feet by 30 feet, in lines:—

First Line.—Eight pits planted in February 1902 with the Bekki Kolley variety of the ceara rubber tree.

Second Line.—Eight pits planted in February 1902 with the Kullat variety of the ceara rubber tree.

Third Line.—Pits vacant—to be planted with Beechlands variety—*vide* paragraph 49 *supra.*

The following species of rubber trees were planted on Bekki Kolley on the 3rd, 4th and 5th February 1902, with a view to seeing whether they will succeed or not in that part of South-East Wynaad, viz.:—

11 Hevea brasiliensis at 25 feet apart, planted 3rd February 1902.

12 Kickxia Africana at 25 feet apart, planted 4th February 1902.

12 Castilloa elastica at 20 feet apart, planted 4th February 1902.

10 Manihot Glaziovii (from the best latex-yielding tree on Bekki Kolley), planted on the 5th February 1902, at 24 feet 4 inches apart.

6 Ficus elastica at 100 feet apart planted 5th February 1902.

a Raised from seed received on the 26th August 1898. The plants are doing well.

b Planted 1st December 1899. The plants are growing vigorously, and are rather bushy in appearance.

c Planted 26th August 1898. The plants are growing well, but have not fruited yet.

d Planted in November 1898: The plants are growing vigorously, and after small trial tappings, they have yielded rubber of good quality. They are, however, too young yet to be profitably tapped.

e This is the tallest tree in the 1898 plantation and is of the same age as the above.

f Raised from seed collected in April 1897, and planted in September 1898. The plants are making fine growth and flowered in March 1902, for the first time. Hitherto, in small trial tappings, these young trees have yielded a somewhat gummy substance possessing scarcely any elasticity and resiliency and therefore destitute of the properties of true rubber. Observations are being continued periodically so that definite information may be obtained as to when these particular trees will yield good rubber of marketable value.

g Raised from seed sown in April 1899, and planted in December 1899—*vide* paragraphs 11 and 18 of report for 1899—1900. The plants are doing well.

h This young tree, which has grown from a cutting put in on the 17th January 1900, now seeds freely and yields rubber of excellent quality.

ADAM'S PEAK IN CEYLON.

[The following paper in the *Scientific American* (July 5) is accompanied by four striking engravings entitled:—Adam's Footprint on Adam's Peak; Shadow of Adam's Peak at Sunrise, the Bibile mountain in the background; Section of the ascent to Adam's Peak; Adam's Peak seen from the inn of Laxapana.—Ed. *C.O.*]

The followers of Buddha in India, Burma, Siam and Ceylon venerate Adam's Peak as their sacred mount; for, on the summit, which rises abruptly like a needle of rock from the mountains of middle Ceylon, there is to be seen, according to their belief, the imprint of a foot of the Buddha. Singularly, the Mohammedans consider this natural depression as a footmark of our common ancestor, Adam. So that Mohammedans as well as Buddhists come every year in crowds from the most distant parts of the country to testify their reverence for this holy relic like the Japanese in their regard for their sacred mount Fujiyama and the Chinese in a similar esteem for their Taishan in the heart of Shantung.

As, in the course of years, I have ascended these two mountains and published descriptions and photographic views, I undertook at the beginning of this year the same task with respect to Adam's Peak, less on account of the sacred footprint than those of the remarkable natural spectacle which has made this mount famous to Europeans; at sunrise Adam's Peak throws a sharply defined shadow, as deep as it is regular. This fact has been mentioned by various travellers, and it is even reported that the shadow has been seen from ships at sea, approaching the harbour of Colombo. But this is denied by the captains of the vessels plying regularly between Ceylon and the harbours of southern India. To some who have

been sailing in these waters for many years the precipitous top of the mount, which appears as sharp as a needle, affords a sign for steering their ships, but they have never observed the celebrated shadow from shipboard. I searched in vain in stores where Indian and Ceylon photographs are kept for views of the summit with the footprint and the temples built there, and decided to take the views myself.

Whoever gazes from below at the lofty peak, rising abruptly like an Indian Matterhorn from the towering masses of Ceylon, considers the ascent much more difficult than it really is. Not only do numerous pilgrims climb to the summit, but Europeans make the ascent every year; some of these, however, would hardly care to repeat it.

By dauntless enterprise a railway has been built in the mountains of Ceylon, and from Hatton, one of its stations, a convenient footpath leads, a distance of about 20 kilometres, to the inn in Maskeliya, which is situated in a valley at the foot of Adam's Peak. From here I started at midnight, accompanied by two guides and lantern bearers, and reached the Peak three hours later by gradual ascent. The climbing of the bare steep granite rock, which has a height of 2,260 metres, is less dangerous than fatiguing. In the upper part, in order to overcome the worst obstacles, series of steps have been cut in the naked rock and iron chains are strung along, similar to those on the Matterhorn.

At 6 o'clock in the morning we reached the summit. The plateau, which may have a circumference of one hundred steps, is inclosed by a wall breast high. Inside are a few low huts for the priests of Buddha and the pilgrims. From the centre of the plateau rises the granite rock 20 metres higher still, and on its very apex stands a small temple, open on all sides, in which the celebrated footprint is to be seen. This is here represented for the first time. (See illustration.) It requires a great deal of imagination to view this depression in the rock as the print of a human foot. The individual must have been of gigantic stature, for the length of the footprint, according to my measurement, amounts to 1.40 metres and the width 65 centimeters. On the south side stands a small altar on which the priests and pilgrims at sunrise deposit delicate white frangipani blossoms and grains of rice, afterwards kneeling with clasped hands and offering their prayers.

At 18 minutes past 6 o'clock a priest called my attention to the splendid disc of the sun, which appeared in the east in a saddle of the highest mountain of Ceylon, the Pedrotalagala. Opposite, on the west side, was seen the peculiar sharply defined shadow of Adam's Peak in magnificent grandeur. Like a dark pyramid of mist, it stood out from the gray background, which gradually became brighter. The higher the sun rose the lower the shadow sank, until finally it lay deep on the mountains at our feet. In two hours and a half after sunrise it faded away. This phenomenon is so peculiar and majestic that it keeps one from paying full attention to the splendid view presented from this lofty peak in every direction over this tropical island, so extraordinarily blessed. It was strange that half an hour after sunrise there appeared by the side of the principal shadow of the mount two others, paler, starting from the top and lower down diverging in direction; these shadows disappeared gradually.

The descent under the scorching rays of the tropical sun proved very troublesome; here and there we passed over smooth granite walls, steep places of 65 deg. Yet the rare spectacle of natural beauty was so grand and unique that I can well recommend the ascent of Adam's Peak to every tourist. There is more occasion to visit this peak than the sacred mountain of the Japanese, the Fujiyama.—For our illustrations and the accompanying description we are indebted to "Illustrir Zeitung.

UPPER UVA, CEYLON, AS A STATION FOR BRITISH TROOPS.

By Anopheles.

[In the "*United Service Magazine.*"]

The transport by sea of a large body of troops after the experience of the South Aftican War excites little comment and with our extensive mercantile marine now presents comparatively few difficulties, provided careful arrangements have been previously made. The ease and celerity with which the British troops were despatched from India to Natal was a momentous movement, the wide-reaching consequences of which are not yet, perhaps, fully appreciated. But it is well known in military circles that the Indian contingent prevented the Boers on the outbreak of hostilities from carrying their victorious arms to the Indian Ocean. At the same time it is fully recognised in the same circles that the Indian Government was reducing the number of white troops to an extent which would be dangerous or impracticable if an unruly native population or harrassed frontier had been engaging its attention.

In the recent Chinese troubles (and further troubles in the near future are likely to again arise) the Indian Government was called upon for aid; thus in our last two campaigns India has on each occasion been called upon for troops, and on each occasion she has gallantly responded to the call. It is the opinion of all thoughtful men that to rely on India for troops in an emergency is a dangerous proceeding. More particularly at the present time when our restless Northern neighbour is pursuing his usual tactics in Manchuria and Thibet. From her geographical position India is admirably situated to deal with any crisis in the Oriental region; on the one hand she can strike rapidly to the west, and other equally rapidly to the east; but when by so doing she renders herself open to attack, and a staggering blow delivered to her would have such far-reaching consequences, it is a serious matter to weaken her unless the point at issue is one of vital moment. It is with diffidence that I, a non-batant, mention the word strategy or deal event in a cursory manner with questions of that military science; but I think even a layman can grasp the strategical importance of the geographical position of India when he considers that officers still on the active list have seen India sending troops to Persia, Cyprus, Egypt, the Soudan, the Cape and China more than once. Granted that she has done this with impunity in the past, it by no means follows that it would be a good policy to do so in the future. What would have been the condition of Natal, and indeed the state of affairs at the Cape at the

present moment, if India from internal causes had been prevented from sending a contingent to South Africa? The point I wish to bring to notice is this—that judging by our recent military history it is not only advisable, but perhaps vitally important to have ready at hand to send in any direction, and at the shortest possible moment, a well equipped, healthy body of men, complete in every detail. to th se portions of the globe where hitherto India has been called upon to send her troops. Now, what are the conditions necessary to fulfil the above?

1—A favourable geographical position.

2—A country not liable to either external or internal attack.

3—Proximity to a good harbour with sufficient shipping.

4—Proximity to a railway.

5—An extensive country fit for military purposes.

6—Adequate local supplies, such as cattle, fodder, &c., &c.

7—A healthy climate for the troops.

The geographical position of Ceylon is practically the same as India. Colombo is the Clapham Junction of the East, where all the large Orient liners of the P & O, Orient, Clan, and other Companies call regularly, and where, consequently, the shipping necessary for the despatch of troops could be obtained and collected. The new breakwater and batteries now under construction will make Colombo secure from the elements and the enemy.

A glance at an atlas will, without argument, satisfy conditions 1 and 3.

Condition 2 is amply fulfilled. The insular position of Ceylon does not allow of its invasion as long as we command the sea, and the loyalty of the native population is such that the present governor, Sir West Ridgway, unhesitatingly offered the services of the only English regiment in the colony for duty at the Cape during the dark days of 1899.

The Ceylon Government Railway meets my fourth condition. It passes close to the country I am about to describe, and has stations at Diyatalawa and Bandarawella, in close proximity to ground in every way suited for a military camp, and within ten hours' journey of Colombo.

With regard to 5; Ceylon, to the majority of people, conveys the idea of a hot, moist, tropical country, enervating to a high degree, if not actually unhealthy. But the hill station of Nuwara Eliya at any rate is now becoming known, and it will not be strange to many to learn that other parts of the hill districts of Ceylon boast of an almost English climate; I may remark, parenthetically, in many respects a good deal better? I am not, however, advocating the claims of Nuwara E iya. It is far too enclosed for the manœuvres of any but a very small body of troops, and even the open country in its near neighbourhood *(the Burrack and Moon Plains) is so studded with bogs and morasses that the movements even of a company would be largely confined to the high road. At the present some thirty or forty sickly men regain their stamina there. after the enervating climate of the low country. Hitherto the Sanatorium has been open from the middle of September till the burst of the south-west monsoon at the end of May or beginning of June. Nuwara Eliya, * from a social point of view, with its racecourse, golf links, club, and so forth, is a pleasant place enough in fine weather, but can scarcely become a station for practical, serious soldiering. In the neighbouring province of Uva can however, be found all the conditions necessary for the military training of 10,000 or more infantry in a healthy country, and with unrivalled climate. This appears such a startling statement that I propose to enter somewhat fully into the physical characteristics of the Province, its climate, and the health of the troops at present stationed there.

I cannot better describe the scenery of Upper Uva than by quotations from an account of a prolonged tour made through the Province in March, 1819, by Dr. John Davy (brother of the famous Sir Humphrey Davy), taken from his 'Account of Ceylon,' published in 1821. Dr. Davy was on the medical staff of the Army in Ceylon, with the title of Physician to the Forces. He travelled from Colombo to Uva *via* Ratnapura, and entered the Province from the Haputale (south) side, over the Idalgashena Pass, and from no point of view is the glorious scenery of Upper Uva seen to better advantage. * He says:—(Familiar to Ceylon readers.)

Dr. Davy visited Uva again later in the year 1819. His first tour was in March. On the second occasion he made his trip from the Nuwara Eliya side (about twenty miles north-west of Diyatalawa), and proceeded only as far as Fort MacDonald six miles north of the camp.

The amphitheatre of hills surrounding the plains of Uva on the west and north effectually prevent the clouds and rain of the south-west monsoon from reaching them. Sir Samuel Baker, in his 'Eight Years in Ceylon,' gives the following account of this curious phenomenon seen during the south-west monsoon, when, while the western side of the island is enveloped in mist and rain, the wet weather terminates abruptly at Hakgalla, and the panorama of Uva is seen in all its beauty. He says:—(Familiar to Ceylon readers.)

I can do little more than refer to a very interesting paper on 'The Botany of the Ceylon Patanas,' by Mr Pearson, B A, published in the proceedings of the Linnæan Society, vol. xxxiv. page 300, which will repay perusal. He enters very fully into the origin and present condition of this open country, and draws a somewhat close comparison between it and the savannahs of South America. He roughly estimates the extent of this patana, savannah or down country, as extending over 300 square miles, the far greater portion of which is in Upper Uva. He summarises his conclusions as follows:—

"An examination of such evidence as exists with regard to the origin of the patanas of Uva, and their western extensions up the slopes of the central ridge, leads to the following conclusions. On the Uva slopes below 4,500 feet (the lower limit of the Rhododendron) the peculiarities of the climate have co-operated with the periodically recurrent grass-fires to transform an open forest of low xerophytic trees with an undergrowth of grass (*i. e.* a savannah forest such as is still found on the eastern boundary of the plateau) into barren grassy plains. These plains, being almost completely denuded of soil, must be regarded as being

* Nuwara Eliya has a rainfal of 99·37 inches, and 2·2 rainy days; average of 26 7-12th years.

* The camp of the Boer prisoners at Diyatalawa is six miles from Haputale at the southern edge of the plateau.

of the nature of a permanent savannah, the natural re-afforestation of the greater part of which is impossible under the present climatic conditions."

The above descriptions, written years ago by Davy and Baker, apply equally well to the present condition of the country. I may say that its general appearance is very similar to the South Downs of England, more particularly their steep escarpments in the neighbourhood of the well-known Berkshire White Horse. In place, however, of the elastic turf which makes those downs the finest galloping ground in the world, the hills are covered with a short, coarse grass which frequently grows in clumps, which makes progression on horseback somewhat difficult. In the convolutions of the hills where the ground is marshy, small clumps of trees and jungle grow thickly, preserved by the wet from the summer grassfires. These marshes, unless the country is well-known, likewise impede the horseman, who is liable to be badly bogged if he endeavours to ride over them. In spite of these difficulties and drawbacks a flourishing pack of foxhounds (the Errebodde hunt) holds its annual meets on these downs, and many a good gallop is enjoyed by the sporting planters in pursuit of the wily 'Jack.' The hills are composed of gneiss, for the most part unstratified, but in many places convoluted and distorted. Above this is the mica-schist, occasionally garnetiferous, in many sections on the hill sides it lies beautifully stratified directly on the underlying gneiss ; in other places quartz is interposed, and its presence has no doubt given rise to speculation as to its being auriferous. Bands of iron pyrites are not uncommon. The soil is composed of these disintegrated rocks with outcrops of gneiss. It is a lttle difficult to say how far Government rights extend, for as far as I can gather no complete survey of the country has as yet been made. But the question of the destruction of crops by the movements of troops is one of no great moment as there is but little cultivation, and the few paddy fields in the folds of the hills are of limited extent, and can be easily avoided.

I am told by competent authority that the country cannot be surpassed for instructional purposes in scouting and outpost duties ; if anything it is too difficult, owing to the irregular and confused character of the ground. I am informed that many parts of the surrounding amphitheatre of hills, with their rocky, steep and frequently precipitous sides, closely resemble the kopjes of South Africa. As a country for infantry, both mounted and dismounted, it is unrivalled, but owing to the absence of roads and other drawbacks it is at present not suited for artillery.

The climate is a decidedly good one, certainly for nine months out of the twelve. From October to January the north-east monsoon brings very wet weather with violent thunder-storms; towards the end of January the weather clear and becomes fine and warm in the daytime and very cold at night, hoar frost being probably not unknown on the patanas. The burst of the south-west monsoon in May, which brings wet weather to the Colombo side of the island, only produces a few showers, but a persistent wind blows from this direction until September and the gradual setting in of the other monsoon. From the middle of June to the end of September men would take little harm from bivouacking in the open air, as the nights are perfect and not too cold. The maximum shade temperature in summer is probably not more than eighty-four degrees, and the minimum fifty degrees. The rainfall is between fifty and sixty inches, * the far greater quantity falling in October, November and December. In such an ideal climate and situation, 4,000 feet above the level of the sea, at the present is the camp for the Boer prisoners at Diyatalawa in the Province of Uva. And in this camp some 6,000 men have lived a healthy but monotonous life for the last twelve months ; monotonous because 5,000 of them are prisoners, and the remainder British soldiers occupied in the deadly monotonous duty of looking after them. If Diyatalawa can justify itself as one of the healthiest stations in the East when its occupants are prisoners and jailors, how much more is it likely to justify it were it occupied by men in the full enjoyment of their liberty ?

By the time these lines are in print it is possible that the war will be over and the prisoners, or many of them, will be returning to their own country.

What is to become of Diyatalawa camp, with everything now ready for the occupation of some 6,000 troops ? Will it be sold for old iron or be kept permanently as a station for British troops? It would be a real boon if only the English regiment in the island was stationed here instead of being broken up into fragments at Colombo, Kandy, Trincomalee and Nuwara Eliya, where the rout in duties of a garrison inevitably tend to mental stagnation and peofessional deterioration.

When dealing with the sanitation of an area, the most correct method of coming to a right conclusion regarding it is by enquiring into the diseases of the native population, and discriminating between the preventible diseases and those that are dependant on local conditions. This method should be followed in preference to that frequently adopted of judging of a locality by the health of those newly arrived In it. in this instance the latter method would be particularly fallacious, inasmuch as of the two British regiments stationed here, one came from the hardships of the investment of Ladysmith, and the other from the malarious district of Dum-Dum, after long service in India. In spite of these drawbacks, the medical officer in charge of the former of these regiments writes in most enthusiastic terms of the physique and healthiness of the men after they had four months' experience of the place, *i. e.* after they had got rid of the diseases they had brought with them or contracted from the Boers. The latter regiment has been here for nearly nine months, and was in a very sickly condition on arrival. Some seventy men have been either invalided home or sent away for change, but how far their complaints were due to local causes or were legacies from Dum-Dum and elsewhere it is difficult to say, but India has probably most to answer for. With regard to malaria, which was rife in the regiment on arrival, it is noteworthy that an examination in August of 600 men, which included a draft of 150 men direct from home, showed that only two men had an attack of malarial fever for the first time here. One of these was a man of the draft. It is interesting in this connection to note that only three speciments of the genus *Anopheles* have so far been captured here ; one by Mr. Green, the Government Entomologist, and two by myself.

* Bandarawela three miles from Diyatalawa and with a similar climate has a rainfall of 64·89 inches ; 40·81 of which falls in the north-east monsoon. It has 127 rainy days : average of twenty-five years. Compare Nuwara Eliya.

If the species had been abundant, many more of the fresh arrivals would surely have been infected with the malarial parasite, with such a large number of malarious cases open to the attacks of the mosquito. *

The native population is remarkably free from disease; the Colonial surgeon informs me that malarial fever is not endemic in the villages round Diyatalawa camp, but it is frequently introduced by the villagers who go on pilgrimages to such malarious places as Tissamaharama and Wellawaya. He also states that the last quarter is the most unhealthy time of the year. Cholera is occasionally imported from the low country, and veneral diseases are not uncommon.

A final word as regards supplies. The camp is about half a mile from the railway, from which supplies are sent into the camp by means of an aerial train. Wood in abundance is obtained from the neighbouring Government forests; the water is good, and can be obtained in reasonable quantity even in the dry weather. Slaughter cattle and vegetables can be obtained to a certain extent locally. The country is suitable for mounted infantry, but fodder is scarce, even the grass which springs up after the periodical burning is very coarse and lacks nourishment; it could be used for bedding, but some method would have to be found to rid it of the ticks of which there are a great number. To buy up the paddy fields and cultivate them with guinea grass (*P. maxmium*) or Mauritius grass (*P. muticum*) would be a serious question. But a trial on an extensive scale on the hill sides should be made of *Paspalum dilatatum*, which grows well at Ootacamund and is a valuable grass for cattle. It is supposed by many to be of Ceylon origin and flourishes on any poor soil, provided it has plenty of water, and at a suitable elevation it will stand the extremes of heat and cold. It is thought very highly of by the farmers of Victoria and New South Wales.

Ceylon, Aug. 31, 1901.

* In the month of August, with an average strength of 862, the average number of sick was twenty-seven, one-third of which were venerial cases. These figures tend to show that the sickness in the regiment was not due to local conditions.

PRODUCE AND PLANTING.

The news received by cable from Simla that the Indian Government intend levying a cess on exported tea at the rate of one-fourth of a pie per pound should stimulate the work of pushing Indian tea in foreign countries. The proceeds are estimated at three lakhs of rupees. Legislation will probably be undertaken in the winter.

The *Times* has the following on the Indian tea cess: "The decision of the Government of India to levy a cess on exported tea at the rate of one-fourth of a pie per pound has been taken in response to a memorial presented to the Viceroy in the spring of the present year by planters representing no less than 78·28 per cent of the capital invested in the industry, and owing 409,000 of the 520,000 acres devoted thereto. The memorial asked that the cess might be limited to five years, and that the proceeds should be devoted to promoting the consumption of Indian tea in India as well as in countries outside the United Kingdom, and otherwise in such manner as might be determined by a committee of planters to be approved by Government. The estimated proceeds of the cess, three lakhs of rupees, are about equal to the receipts from a similar charge levied in Ceylon on all exported tea. Owing to the excessive production in both countries in recent years, the supply to the United Kingdom has much exceeded the demand, and prices have continued to fall. Hence the memorialists urged that tea growing in India could only be continued on a remunerative basis by comprehensive measures being taken to open new markets. A voluntary cess has been in operation for some time, but has only yielded about half the amount that will be obtained when statutory authority for the impost has been given. The memorial pointed out that the proposal affected the tea industry alone, and its adoption could have no adverse influence upon any other trade or industry or on the community in general."

We reported in our issue of the 25th ult. Mr. Consul Playfairs' views on the decline of the Chinese tea trade, and Mr. J Scott, Acting Consul-General at

CANTON,

writing about the methods of the Chinese, says:—"The once important and lucrative tea industry has been almost ruined by Chinese apathy and neglect. The growers in the interior pay little or no attention to their plants, and do not trouble to renew the old bushes as they become decayed. The leaf is picked anyhow and at any time as prices appear favourable, with the result that, carelessly handled and fired, the tea, on reaching the London market, is frequently found affected or deficient in strength, body, and colour. It does not, therefore, come as a surprise to learn that the steady decrease in the tea trade has continued during the past year. Thirty years ago Canton exported to Europe some 13,000,000lb of black tea, and nearly 2,000,000 lb. of green tea. Today Canton export is represented by less than 1,000,000 lb. consisting chiefly of Congou. The well-known scented capers for which Canton was famous, and of which some 7,000,000 lb. were exported in 1872, figure in the Customs returns for 1901 at an export of 5,790 lb. only. These figures do not, however, give an accurate return of the entire export, as many shipments are arranged in Hong Kong, to which port the tea is conveyed by junk, and does not, therefore, pass through the hands of the Imperial Maritime Customs. The following figures, for which I am indebted to an actual dealer, provides a comparison in the trade in scented capers during the past three years: 1899, 4,900,000 lb; 1900, 3,700,000; 1901, 3,000,000 lb. A further depressing feature is that the monthly returns of deliveries in London also mark a decline which would lead one to suppose that Canton scented capers are rapidly going out of consumption. The season now under review cannot be said to have been a favourable one as regards quality, nor was it remunerative either to foreign buyers or native sellers. Taken all round, the various crops during the season were of a fair average quality, but there was a considerable quantity of leaf left on the hands of natives from the previous season. This they had to work off by mixing it with the new season's leaf, a practice that no doubt had a detrimental effect, and which would have been accentuated had not scenting flower been abnormally cheap and abundant, whereby it was possible for the teas to be scented above the average."

The Japanese seem greatly interested in the American tea-growing experiments. Sinko Hatto, a Wealthy Japanese now residing in New York, has been appointed by his Government to make a thorough study of tea growing conditions in South Carolina, Mr. Hatto says that his Government had been greatly interested in the published reports from the plantations in South Carolina and desired to got facts as gathered by a personal representative.

Coffee planters may well ask to be saved from the ingenious people who seek to produce adulterants to their product. In Austria they make a product called coffee of figs, which is supposed to be appreciated in Germany and Austria-Hungary. Nutritive power is claimed for it. It is obtained by drying fruit—especially figs—and mixing them with coffee. It acts

as a colouring agent, and diminishes the excitant quality of the coffee and corrects its taste—save the mark! Several establishments in Algeria now manufacture fig-coffee, which is already used in Europe.—*H. and C. Mail*, August 8.

TEA IN PACKETS: COLOMBO THE MODEL.

Mr. H. Drummond, Deane writing from Peermaad, under date, 18th August, to the *Madras Mail*, says:—"I have read with interest the articles on the 'Tea Markets Expansion Commission' in your issue of the 15th instant, and I am at one with you in wishing all success to the enterprise of Messrs. Yule and Co. But it is to be deplored that the teas are not packed either in lead or at least damp-proof paper as made in China. Another fatal economy, peculiar to Calcutta merchants, is the want of firing machines for refiring teas before packing into packets. Contrast this with Colombo where I venture to state from experience no firm of any importance dealing in packet teas, or indeed acting as Agents for tea estates, is without some sort of firing machine, without which no repacked tea will maintain its flavour or aroma for any reasonable time. The consequence of this fatal parsimony will be that in damp whether within a month of distribution the teas will become mouldy and unfit for consumption. Yet the small dealer, as is well-known, will sell every packet if possible. Consequently, for every two packet of tea going into consumption and appreciated, the probability is that the moiety will cause disgust to the would-be convert. If it is found too expensive to put up one-pie packet in lead, at least give the tea a chance by packing it hot from a firing machine, and with every 100 packets supply an air-tight tin case with printed instructions urging the necessity on small dealers of keeping the tea free from damp. Any tea expert will bear me out in these remarks which apply to any teas sold in a climate such as Calcutta and Southern India. Possibly in the far North the climate, being drier, more resembles Europe where such precautions are not so necessary."

GREEN TEAS—AND GREEN TEAS.

We trust our readers will feel themselves enlightened by the "prodigious" correspondence with which Mr. Judge of Calcutta favours us today as Agent for the "Drummond-Deane green tea process." It is marvellous, however, how hard it is to get some people to give up misconceptions. For instance, in an editorial in "Indian Gardening and Planting" of August 21st, discussing Mr. Hart's letter which has set Mr. Judge to write, the editor says:—

A comparison of Mr Robert Hart's letter and our article, which it professes to set right, will show that Mr Hart and ourselves have been writing about different things, and that therefore his letter is no criticism of our article. In the first place, our article was called for by certain statements in the *Ceylon Observer* praising and advocating the artificially coloured teas produced at the Central Factory in Ceylon.

Mr. Judge himself too, uses the same term in this application. But surely he and the editor have not still to learn that the teas produced at Ambewatte Mills are *not* "artificially coloured," and that this has been vouched for not only by local and American experts, but demonstrated to the satisfaction of leading Ceylon planters on the "Thirty Committee," who have been allowed to inspect the process? The sooner our contemporary, therefore, withdraws this allegation and apologises to the *Ceylon Observer*, the better. Even the local "Times" has been lately coming round to admit the superiority (including the purity) of Ambewatte-made teas. The sales in the London and American markets and the prices realised, have long ago shown where the superiority lay; but the drawback is in the comparatively costly means of preparing these teas as compared with the easy and economical Drummond-Deane process. Were it not for this, Ceylon planters and agents would probably ere now have freely followed the example set them in the Ambawatte Mills. As matters stand, we can only wish well to both processes; for we want to see a greatly increased quantity of green tea made before the end of this year, and although the Ambawatte Factory was stated to be equal to turning out 3,000,000 lb. per annum, we fear it is not going to do much more than one half of this quantity for 1902; although it is expected to turn out 250,000 lb. a month from now up to the end of the year and will no doubt continue at that rate during 1903.

REDUCTION OF OUTPUT: AND TEA FROM LOW AND MEDIUM ESTATES; THE DUTY, &c.

It is pointed out that without any combination the proprietors and managers of estates at a low elevation, to a great extent, control the situation as to the quantity and quality of teas that may be turned out If they pluck carefully and fine, to make good tea, estates higher up must go one better in order to secure proper value for their teas; and the result will be careful plucking all round and a considerable restriction of output. This, of course, would quite meet the proposal of Mr. E. J. Moss, of Foochow; and so long as there was a satisfactory demand—as at present—for good and fine teas, to study quality rather than quantity should be the more profitable policy. But, unfortunately, there are apt to be swings of the pendulum even in Mincing Lane, and when one of these occurs, there is a great temptation again to go in for the manufacture of common teas.

The Mangosteen on the Nilgiris—is now well established, and yielded a fairly good crop at Burliyar. It will surprise many people to learn that "the first two fruits of the season were received on 25th June 1901, but the main crop did not ripen until October and November:" an interval of five months between the first ripening and the main crop!—*Indian Gardening and Planting*, Aug. 21.

TOBAGO AND THE WEST INDIES OVER 200 YEARS AGO.

(*By Old Colonist*)

I have been favoured with a copy of a very interesting old book entitled, "The present prospects of the famous and fertile Island of Tobago, with a description of the situation, growth, fertility and manufacture of the said Island," *by Captain John Poyntz*, first published in 1683, exactly two years after the work of our own Captain Knox on Ceylon. Tobago, as all readers of the *Tropical Agriculturist* know, is a very tiny island, 26 miles long by 6 or 7 broad, lying within 18 miles of Trinidad, to the Government of which it was annexed only 12 years ago, after rather a chequered history. It is only about 1-15th the extent of Trinidad and both together would only make 1-13th of the area of Ceylon. Yet, there is a certain interest attached to anything published 220 years ago, and the minute details of the product of this little Gem of the West might have been intensely interesting to the *Tropical Agriculturist* of today, had the descriptions been a little less exaggerated.

The literary style of Mr Poyntz, like that of good Mr Robt. Knox, is quaint in the extreme:—"The courteous reader is here presented with the present prospect of the Island of Tobago, about 40 leagues distant from Barbadoes; but far excelling that Island or indeed any other of the Caribee Islands in the fertility and richness of the soil. Yet exempted from those affrighting and destructive hurricanes that have been often fatal to the rest of the Caribee Islands. I am persuaded there is no island in America that can afford more ample subjects to contemplate the bounty of the Great Creator than this of Tobago, and I speak not by hearsay, or as one who has lived always at home; but as one who has had experience in the world and seen almost all His Majesty's *Foreign* plantations, and after having viewed them all, have chosen this Island to take up my *quietus est* in."

The "courteous reader" is now introduced to an array of plants, fruits, birds, beasts, and fishes rarely before heard of from one island, and some of which to this day are unrecognisable. I doubt for instance his plethora of luscious grapes as I have never found such in a *moist* tropical climate.

Tea, also, he says: "grows naturally and plentifully here, meaning such tea as is frequently sold in English coffee-houses." Poor Poyntz had probably seen the Paraguayan article, but *Thea Sinensis* not at all likely. It might here be observed that tea and grapes are never produced commercially in the same country, the conditions which favour the one being the opposite of what would suit the other. Pineapple, he confesses, "*is a fruit of that excellency that I want Rhetorick and Oratory to express it.*" The *papaw* and *mammee* are grateful and appetising.

"The plantain of all fruits the Negro loves best. A sovereign wholesome food, some eat them raw when nature has ripened them; others boil them green. Now to roast them they are bread, to boil them they are sauce or marmalade, but to barbecue or dry them in the sun they may rub them to a flour." (Curious to note the idea of desiccating the plantain, never yet commercially carried out.*)

"The coconut the Indians idolize it, and call it God's tree: because it gives both meat, drink and cloth. It is true beyond dispute that the nut of itself is sweet beyond the sweetest almond and the liquor to my liking beyond *Florens* or *Frontinack*. Of the prodigious pumpkins, I blush to express their magnitude!" The book altogether is more curious than instructive. I have already stated that the date of publication almost coincides with that of Robt. Knox's Ceylon, and is written in the same quaint style. But here the similarity ends. Robt. Knox had no special axe to grind, was a man of inflexible honesty who studied and wrote from the sheer love of acquiring and imparting reliable information.

Captan Poyntz was evidently a man of quite another type. Had he lived today he would have unquestionably been a great success as a Company promoter: a scrupulous veracity being by no means his strong point, and the whole object of his glowing description crops out in the concluding chapter:—"Showing that he had acquired from the *Duke of Courland* 120,000 acres of land on the said island for a Joynt Stock Co. for subscriptions of any persons who are willing to be adventurers in the same."

The little island, since that day, has seen many vicissitudes, now British, now Dutch, French and Spanish, but finally conceded to Britain. And, small though it be, it is worthy of more attention by trained tropical planters than it has hitherto obtained. Being beyond the zone of eruptions and hurricanes, with good soil in a healthy, forcing climate, it offers excellent prospects for the planter and fruit-grower.

No leaf blight there. No frost to frighten the orange-grower. Investors of recent years are, I know, well satisfied with their returns.

The Season Upcountry this year is what would be described twenty-five to forty years ago as "a perfect coffee-blossoming season." Indeed, where a little coffee is still found, as in Dumbara, there has been a wonderful blossoming display; but then the rain is wanting to bring the pin-point beans to maturity, and in place of many thousands, probably, only as many hundreds of bushels will be gathered. In respect of "tea," a sign of the season is the great extent to which the bushes are flowering—not so much as yet in the higher as in the medium and lower districts, and this, of course, means a check to flush. In some cases, coolies may have to be put on to strip off the flowers.

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* Surely it has: plantain or banana flour is made in Jamaica and Queensland and desiccated plantains are sent from Singapore, we believe?—Ed. *T.A.*

A NEW WEED CUTTING MACHINE.

On a recent broiling, sunny day, I journeyed up through the beautiful Thames valley, branching off at Oxford to the staid and picturesque old town of Woodstock, to see a new machine with which Mr Angus, the Duke of Marlborough's agent, is more than delighted, for it has rid him of one of his greatest annual worries. Every spring the famous Blenheim lake yields a vast crop of tangled masses of weeds, which give it the appearance of a green field, and effectually puts a stop to boating and sailing, and to a lesser extent fishing, during the summer months. The clearance of these weeds has hitherto been a great undertaking, not only tedious and laborious, but costly. Now, thanks to the new invention, the work is carried out speedily and at a comparatively small cost. I should explain at once that this is not a machine intended to drag up the weeds by the roots or to dredge a lake of mud, but a weed cutter pure and simple, working on the principle of the reapers now used by every farmer except in mountainous districts, a boat taking the place of the iron wheels used on land, while the horse is represented by an oil motor or a steam engine.

It was a short walk from the entrance gates where Mr. Angus met me, down the sloping bank to a narrow backwater, where the remarkable little vessel was waiting us, steam up, and apparently fizzing over with anxiety to begin its arduous work of cutting a 10ft. channel through the weeds. As orginally designed by Mr. Hall, it was intended to be worked by an oil engine, but the intricacies of these are somewhat beyond the knowledge of the ordinary estate hand, and Mr Angus decided to dispense with the oil motor in favour of a 6-h.p. steam engine, which does its work very efficiently, and is certainly the very thing for a large expanse of water such as exists at Blenheim or for keeping open the navigation of canals, sluggish rivers, and the like. In the larger illustration will be noticed two huge levers standing up diagonally from the sides of the boat. At the other end of these are to all appearance ordinary reaping knives. Those are under water in the photograph, but their position will be understood by a reference, to the diagram of a small set of apparatus having one knife only. By raising the lever the knives sink in the water to a depth which can be regulated, and may be anything down to about 4ft. When there is no weed cutting to be done, and the boat is simply required to travel, then the levers are depressed level with the gunwale of the boat and the reapers rise up just above the surface. It will be seen that the boat is propelled by two stern paddles. Between them is the rudder, and as the rudder is moved to port or starboard, the paddles have a lateral movement with it and help considerably in steering which is a decided advantage when dense masses of weeds are being cut. The two sets of reaping knives do not quite meet under the stern, but there are guiding rods which carry the weeds, passing exactly down the centre of the boat on to the knives and very few escape.

I had not been on board five minutes before we were steaming through a terrible looking bank of weeds at a pace of between two and three miles an hour. The machine worked smoothly, and without the slightest hitch. The power of the knives must be enormous. A very intelligent man who was steering the boat told me that on one occasion they accidentally came on a piece of wire cable, which some men who had been working a steam plough or other piece of agricultural machinery had thrown into the lake. The knives cut it through instantly but the mechanism of the little launch was none the better for the accident. It will be understood, however, that knives which can cut through steel cable may be relied upon to sever anything in the way of weeds.

Leaving this end of the lake, and going through the fine bridge which divides the upper and lower waters, we next attacked a bed of water lilies, and here again the machine was as effective as ever. When travelling in open water it steamed at from four to five miles an hour, so far as I could judge. Mr Angus kindly favours me with the following notes concerning the particular machine he uses. It will be seen that the Blenheim weed-cutter is a somewhat expensive one. In the printed particulars of the invention I note that what is recommended by Mr Hall is a standard size, having knives five feet wide to work four feet or less under the water. In these particulars it is said that the machine can be clamped to the gunwale of any boat or punt, and that it can be worked by hand or engine power. Where worked by hand power, one man would have to row the punt while another turned the wheel which works the knives. The particular machine which I saw at Blenheim is, however, undoubtedly the most economical in the long run where large areas of water have to be dealt with. It will be seen from the smaller illustration that in the cheap machine to be fixed to the purchaser's boat the cutter bar extends on one side only. But to come to Mr Angus's notes. He writes :

This machine, invented and patented by Mr Charles P Hall (His Grace the Duke of Bedford's agent), Estates Office Woburn Beds, is in my opinion one of the most valuable inventions for weed cutting on the market. Here at Blenheim where we have two sheets of water measuring close on 120 acres, it has been in use for the last three weeks with most satisfactory results. The lakes have been partially cleared of weeds each year by see-sawing shackled scythes from a punt. This method was most expensive and inefficient; the weeds were cut in crescents, those near the ends of the scythes being only topped.

By means of this steam weed cutter we can cut from 1 ft to 4 ft below the surface of the water, and take a breadth of 10 ft 4 in. In my opinion if the work is commenced early in April or the last week in March no weeds will ever see daylight. If this is so the enormous work of bringing to shore thousands of tons of matter will be avoided and the weeds will no doubt become weaker every year. The weeds which are our greatest bane are the *Callitriche stagnalis* (the water star wort), and the *Hippuris vulgaris*—the mare's tail. Both are easily cut with the machine in question. The flat-bottomed little vessel which carries the machinery is 27 ft 6 in long, 5 ft 3 in broad, and draws about 1 ft of water when two men and the necessary coals. &c. are aboard. The boiler is 6 h.p and this drives a vertical reversible engine which not only works the propellors—stern paddles—but the two separate reaper knives. 2½ cwt of coal a day are used, and a man and a boy are the only hands required. The price of the machine in the form I describe is £225. Cutters worked by petrol engines or electric ones are no doubt cheaper, but for reliability and simplicity I cannot but think a steam driven one is best.

In the case of the Duke of Beaufort's Woburn estate, the machine resulted in a saving of about 75 per cent as compared with the expense of weed cutting by the old method. So far as I was able to judge, the machine used at Blenheim does its work as efficiently as any machine of the kind which is likely to be made. The less powerful and smaller machines will, of course, do their work more slowly ; of them I have no experience. The machine does not clear away the weeds, but merely cuts them. The removal of the weeds from the lake has to be done afterwards from the bank. A rope is generally run out and surrounds a mass of cut-weeds, draws them ashore, and they are lifted out by means of rakes. It should not be very difficult to devise a machine which would lift weeds from the water and deposit them in a flat bottomed craft of some kind, but this would only be of advantage in large sheets of water.

It would be very interesting to know what view the fish take on weed cutting machinery. Those who desire to preserve fish should certainly cut their weeds with the greatest possible discretion, leaving patches here and there for shelter to the fish from

the light. It is a point of the greatest importance that care should be taken not to cut the weeds in the spring until after coarse fish have spawned, and the fry have become large enough to "flee awa'" on the approach of the knives and paddle wheels—the latter, I think, more disturbing than the former. The makers of the machine, I notice, recommend the cutting of weeds just before they reach the surface, and to cut them again and again throughout the season in order that the leaves may never breathe, asserting that if this is done they will become so weakened that they will gradually die out. This process, however, may mean the almost total destruction of one year's brood of coarse fish. Land agents and others who have the management of these matters should certainly make themselves acquainted with the times at which the various fish in the waters on their estate spawn, and watch the hatching of the eggs and growth of fry in order to ascertain when the weed cutting may be carried out without injury to the fishery. JOHN BICKERDYKE.

—*Field*, July 26.

PISCICULTURE.

Now that interest is taken in the East anent the importation of trout ova from Home with a view to the introduction of that game fish to Ceylon, the Doon, the Neilgherries, and Kashmir, it may not be out of place or devoid of interest for us to give a short resume of the necessary process and period of incubation. This we are enable to do through the courtesy of a friend, an expert, who has furnished us with a lengthy communication regarding the acquarium and exhibit of hatching apparatus at the International Exhibition now being held at Cork. From this letter we are enabled to produce the following article :—

"As most people are probably aware salmon or trout designed to supply ova for artificial propagation are caught some little time before the breeding season, and impounded in small enclosures where they can be kept under observation. The males, which can easily be distinguished by the colour of their bodies and the shape of the lower jaw, are separated from the females, and the latter are divided accordiug to the time which appears likely to elapse before they are ripe. While ripening, the spawn is held in the tissue of the roe or ovary, but when thoroughly ripe the ova becomes detached and are loose in the general body cavity. This process completely alters the appearance of the fish. A hen fish with spawn not yet ripe is of compact form and firm to the touch, but once the ova are ripe and detached, if the fish be held up by the tail, the ova falling away to the front end of the abdomen eause the shape of the fish to "bag" in most unmistakable manner. The hen fish is now ready for "stripping." The operator holds her tail downwards, over a pail or can, and very gently presses the lower side of the body. After a few kicks by way of protest, not unnatural under the circumstances, she begins to yield her eggs in a continuous stream, her quota being about eight hundred to every pound of her weight.

Once "stripped" she goes back to the water none the worse for having been artificially relieved of all family cares. It is then the turn of the male, and when enough of his contribution has been poured on to the eggs, the latter are stirred round and round with the hands, and then covered with water. Fertilization is rapidly effected, and after an interval the eggs are washed and laid in the hatching trays. With reasonable care and gentle treatment absolutely no harm is done to the parent fish; but artificial progagation is only too often brought into disrepute by ignorant and clumsy operators, who wrench the spawn from the bowels of the fish without knowing or caring whether it is ripe or not. A big fish, even if quite ripe, is not too easy to handle, and in such cases resort may be had to the "straight waistcoat" exhibited at Cork. It is used by Mr. Fitzherbert in his hatchery (perhaps the best appointed in Ireland) on the Boyne, in which a million and a quarter salmon fry were hatched last season.

Around the walls of the Irish Exhibition building is arranged a series of hatching-boxes as used at the principal salmon hatcheries in European and America. A number of these are fitted with water-supply and drain, but, of course, contain no ova, as no salmon or trout could be induced to postpone their family arrangements for the convenience of visitors to the Exhibition. Indeed, the few thousand rainbow ova which were hatched in the watercourse of the trout-farming exhibit in the grounds were probably the very last clutch of the season. At Cork the apparatus, although entirely practical in installation, is displayed in such a manuer that all the details can be seen. In addition to those from other nurseries, incubating and hatching boxes are exhibited from Herr Jaffe's hatchery at Sandfort in Hanover. The incubating box, filled with boat-shapped trays of wood and coarse perforated zinc, will accommodate 24,000 ova, until the eye of the embryo can be seen. The coarse zinc of the trays does away with the necessity for a filter, and as the sediment can readily be shaken through to the bottom of the box, where it does no harm. When the eggs are "eyed"—(that is when the eyes of the embryo can be seen through the shell)—they are best transferred to the "hatching-box," with narrower trays fitted with finer zinc; or the coarse trays in the 'incubating-box' may be replaced by others of the same size fitted with No 9 zinc : but Herr Jaffe prefers the narrow box on account of the greater concentration of water. The 'incubating-box,' although certainly desirable is not absolutely indispensable, as the 'hatching-box' can be used for the whole process. Once 'eyed,' the ova are so hardy that the trays can be lifted bodily out of the water and all sediment washed away by the use of a garden syringe. Hatching takes place about twelve weeks after fertilization in the case of salmon, which spawn mostly in December and much sooner with rainbow trout which as a rule do not spawn much before March. In the case of salmon fry, much trouble and expense can be saved by using the 'floating redd,' another of Herr Jaffe's devices. One of them (in which the young rainbows were hatched) can be seen in the watercourse. It is simply a floating box with zinc sides and accommodation for the trays. The "redd" for practical purposes would be moored in the natural stream in which it was intended to ultimately liberate the fry. Eggs, taken from the "incubating-box" as soon as "eyed," are placed on the trays of the "redd." Here in due course they hatch, and when the babies are about six weeks old they are allowed to escape through the door at one end of the "redd," and seek their own way to fame and fortune.

Trout intended for farming purpose are hatched at Herr Jaffe's establishment in "hatching-boxes," and transferred when about ten days old

to a "floating nursery." One of these latter may be seen, stocked with babies, in the watercourse. The youngsters are fed four times a day with finely grated liver, and in about a month's time will be transferred to one of the ponds.

Among the other patterns of "hatching-boxes" exhibited are those from Scorton (Lancashire) and from Dumfries, N.B. In both of these patterns the eggs are accommodated on glass grills. In the boxes from the Dee Fishery, and from the Surrey Trout Farm, the trays are of peforated zinc. Both have partitions in the lower parts of the box for even distribution of the water. In the Midland Fishery box the trays rest on wires, and oscillate, for the purpose of shaking out the silt, to a touch of the hand. America is represented by boxes from Craig Nook on the Atlantic, and Battle Creek on the Pacific side.

Of the different forms of apparatus shown, it may briefly be said that all are equally efficient in skilful hands. The palm must, therefore, go to the kind that best combines economy of construction with simplicity of management. On this account little difficulty will perhaps be felt in selecting the Sandfort pattern.

In India there is no possibility of establishing a Salmon Fishery. Trout-farming, however, is a most profitable industry, and we hope to see it in time firmly established in Kashmir, where the authorities, the climate, and the natural features of the country and mountain streams are favourable to the venture. In Germany it has proved capable of acclimatization; and we trust that the results of recent importation of ova to the East will be such as to encourage private enterprise in the future, if not State; for the public importance of such fisheries is now well enough understood all over the civilized world, and its prospective value to Kashmir and other favourable localities in, or bordering on, our Indian Empire cannot be overestimated.—*Indian Field*, Aug. 21

CHINESE TEA.

To the Editor of the "Home and Colonial Mail."

SIR,—I noticed a paragraph in your issue of last week in which you commented on the report that there was a large demand for China tea in the tea-room of the House of Commons, which you supposed was an indication of the spread of the Imperialist idea. Has it occurred to you, Sir, in reading the reports of the various Consuls in China, that it might easily be believed, if one judged by these reports alone, that China was a portion of the British Empire? It is quite necessary that the British Consuls at the Treaty Ports should record facts about the tea trade, but it seems strange to find them actually pointing out the excellence of Chinese tea, and depreciating Indian and Ceylon tea. I have frequently noticed that in these Consular reports it is assumed that the falling-off of the trade in China tea is a circumstance to be deplored. This may be, for aught I know, perfectly legitimate on the part of a Consul at a Chinese port; but when we consider that British-grown tea has taken the place of China tea in most of the markets of the world, there should be nothing very depressing in the fact to a British subject, even if he be a Consul in China.

The British Consul at Fu-Chau in his last report, which has been printed in several of the leading home journals, describes the tea trade of China as a vanishing industry, and attributes the decline to the Indian and Ceylon competition, and to the obstinacy of the Chinese tea grower, who refuses to reform his method, as well as to excessive export duty as regards the neglect of the grower to use due care in the manipulation of the leaf when growing and being picked, as well as in the preparation for export. The Consul says: "The means of ensuring this has been repeatedly indicated to him and put within his reach, but with no result. He has been in turns implored, scolded, and lectured, but all to no purpose. Some years ago a circular was issued by Sir Robert Hart, warning tea growers that, owing to the superior methods prevailing in India, the trade was slipping away from China. It was recognised by Europeans interested that the progress made by India and Ceylon had been secured by the substitution of machinery for hand labour. Machinery was accordingly imported. While Formosa was still Chinese the Governor imported into the north of the island, not only the machinery considered desirable, but even an expert from Assam. But neither in Formosa nor in Fu-Chau have those devices proved of any avail. Next there is the change which has come over the public taste in Europe. When Assam and Ceylon entered into the competition with China it was soon apparent that the liking for their products was increasing rapidly, and China tea was in no long time hopelessly distanced."

Now there is nothing to complain of here, but note what follows. "It is likely that, as regards delicacy of flavour and aroma, the teas of China are still assured of the suffrages of the cultivated few. Teas from the nearer East are admittedly coarser of taste and contain a larger percentage of tannin, on which account they are condemned by medical men as prejudicial to digestion. But they make an attractively dark brew and are economical. Thirdly, the trade in Indian and Ceylon teas has been fostered by judicious and persistent advertising, to which the Chinese merchants will not resort. Lastly, the trade is crushed by an excessive export duty."

The Chinese tea growers, if they do not advertise, as the Consul points out, are at least fortunete in the fact that they practically receive free advertisements of the excellence of their tea from the officials of a country whose sons are actually competing with them in the growing of the product, and who have to trust to their own enterprise in the competition for the tea markets of the world.—I am, Sir, yours, &c.,

AN INQUIRING PLANTER.

—*H and C Mail*, Aug. 8.

PLANTING NOTES.

THE ONCE IMPORTANT AND LUCRATIVE CHINESE TEA INDUSTRY—(writes the British Consul-General at Canton) has been almost ruined by Chinese apathy and neglect. The growers in the interior pay little or no attention to their plants, and do not trouble to renew the old bushes as they become decayed. The leaf is picked anyhow and at any time as prices appear favourable, with the result that, carelessly handled and fired, the tea, on reaching the London Market, is frequently found affected or deficient in strength, body, and colour. Thirty years ago Canton exported to Europe some 13 million pounds of black tea and nearly two million pounds of green tea. Last year's export was less than one million pounds, consisting chiefly of Congou. The monthly returns of deliveries in London also mark a decline, which would lead one to suppose that the well-known scented capers for which Canton was famous are rapidly going out of consumption. The recent decision of the Chinese Government to lower the export duty on tea to 5 per cent *ad valorem* may have some beneficial effect upon the trade, and will enable low-priced Chinese teas to compete more favourably with those of India and Ceylon,

Government Analyst, Trinidad.—We have from time to time noticed and quoted the good work done by Professor Carmody. F.L.C., F.C.S., in Trinidad. We have now secured a copy of his annual report for 1901-2 showing in detail the work done. Of samples analysed the number was 2,210 against 1,747 in the previous year. Not only agricultural and industrial, but Customs, criminal and miscellaneous samples are detailed. Altogether a notable record of work.

The Coconut Crab.—The following paragraph occurs in *Nature*, 24th July:—

To the *Notes* from the Leyden Museum Dr R Horst contributes some remarks on the habits of the coconut-crab, based upon observations made on captive specimens at Batavia and living examples near Bantam by Mr C P Sluiter. Recently some doubts have been expressed as to whether it is in the habit of ascending palm-trees. Mr Sluiter has, however, seen these crabs climb to the top of mangrove-trees and palms fully 60 feet in height. What they did when at the top he was unable to ascertain, but from observations made on captive specimens, he considers it probable that they were engaged in opening young coconuts and devouring their contents. Whether they have the power of opening ripe coconuts could not be determined, the specimens under observation merely fumbling such as were given them without attempting to penetrate the shell.

Can any one tell us of crabs being found on coconut palms in Ceylon? They are not once mentioned in our Manual of the Coconut palm.

Infused Tea Leaves as Manure for Roses.—In the proceedings of the Agri-Horticultural Society of India, which we publish in another column, will be found an enquiry from Messrs. Andrew Yule and Company, the Indian Tea Expansion Commissioners, as to whether infused tea leaves make a good manure for roses. It may be well to state the case fully for the benefit of our readers. The leaves of the tea plant, when plucked for the manufacture of the tea of commerce, are first withered or wilted, then passed through a rolling machine by which the cells in the leaves are broken up. This mass is then "fermented," and lastly dried by hot air in the tea dryers. The infusion of the tea in boiling water liberates the theine, or active principle, a large proportion of the tannic acid, and the essential oil. It is these organic substances that go to form the infusion of tea which we value so much. The organic matter, *i.e.*, the tissues, as well as some of the mineral constituents of the leaf, are left, and it is this that Messrs. A. Yule and Company wish to utilise as manure for rose bushes. If the infused leaves are treated in the same way as other leaves for the production of leaf-mould, *i.e.*, by rotting, there is no reason why they should not make a good manure for roses or any other plants. But to apply the infused leaves, *without* putting them through the process of decomposition, would be to court disaster for the rose bushes. If Messrs. A. Yule and Company desire to realise some revenue from the infused tea leaves, they should sell to native nurserymen, or "charawallahs," or to any one else who grows roses and garden plants. There is, however, one purpose for which infused tea leaves are largely used at home, and that is, for cleaning carpets in dwelling houses. The damp leaves gather up the dust, and thus render the housemaid's work easy.—*Indian Gardening and Planting.*

Manure for Roses.—Artificial manures, say a German contemporary, if properly chosen and applied, are the most useful, as by their use vigorous growth and fine flowers are obtained. Raw bone-meal, in point of usefulness, is preferable to manures containing phosphoric acid; but the manure most to be recommended is potash, and two dressings afforded during the summer have all the favourable results which one can desire from a manure.—*Indian Gardening and Planting,* Aug. 21.

Tea in Ceylon in 1802.—We are indebted to an upcountry correspondent for the following "cutting" from the London *Observer* of July 27th, 1902, reproducing what appeared in the same paper, one hundred years earlier or in July 1802:—

"A late attempt has been made by a naturalist of eminence to cultivate the tea plant in the island of Ceylon, but notwithstanding almost all the trees, plants and flowers of this part of the globe seem collected there the experiment has totally failed."

The second attempt made with tea was well-nigh 50 years later by the Messrs. Worms on Condegalle, also without success.

Economic Products in Trinidad.—Mr J L Hart, Superintendent of the Trinidad Botanical Gardens, in his annual report for the year ending March 31st, 1902, states that ginger can be very successfully cultivated in Trinidad, as the plant grows well and rhizomes are of excellent size. A plot devoted to this product yielded at the rate of ten tons per acre of the undried rhizomes. Kola grows fairly well, but as it takes some years to come into bearing no results have yet been obtained. A plot of turmeric has yielded at the rate of two tons per acre of green tubers. Cloves are found very difficult to rear through the early stages, but grow well when established. The section devoted to black pepper has made fair progress, but the plants have not yet reached their fruiting stage. The camphor-tree grows rapidly in Trinidad, but never attains a large size. Camphor and camphor oil, both of good quality, have been produced, and it is intended to grow a plot with a view to testing the feasibility of growing it on a commercial scale.—*Chemist and Druggist,* August 2.

The late Mr. Oliver Collett.—*Nature* of July 31st has the following:—

Natural science in Ceylon has sustained a severe loss by the untimely death of Mr. Oliver Collett, F.R.M.S., who, while carrying on actively his vocation as a tea planter, found time for excellent original work both in the field and laboratory. He devoted himself especially to the Mollusca; and a genus and several species of land shells bear his name. As a member of the Ceylon branch of the Royal Asiatic Society he contributed various papers on zoological questions. He also brought his scientific knowledge to bear on some economic questions in connection with the cultivation of tea, and was much esteemed by his fellow planters, being at the time of his death Chairman of the local Planters' Association. Mr. Collett, who was thirty-five years of age, possessed a very attractive personality, and many, both at home and in Ceylon, who were brought into contact with him by common interests, deplore the loss of a charming friend and an enthusiastic naturalist. He died on June 13th, somewhat suddenly, at Colombo from an attack of dysentery.

TRADE FOR FIRST HALF OF 1902.

TEA EXPORTS.—Quantity.—The total output for the six months was 78,291,151 lb against 79,019,338 for the same period last year. Of this, 56,320,866 lb were shipped to the United Kingdom against 59,113131, a decrease of 2,792,265 lb, while shipments to Russia, China, America and Africa shew an increase of about 3¼ millions and to Australia a decrease of about one million. The quantity of Tea offered in public sale in Colombo was 28,805,342 lb against 26,620,270 lb for the same period last year. Quality.—The quality though not as good as last year, has been up to the usual average.

Prices.—The average prices at the Colombo Sales have been better than those that obtained for the same months in 1901.

Average 90	.. ..	31·52
„ 1902	.. ..	33·81

During the earlier part of the year prices ruled from 32 cents to 37 cents against 27 to 35 cents, but the position was reversed for two Sales at end of March and early April, but resumed the higher range during April and May, falling 1 to 2 cents in June below 1901. The price of Common "Leaf" Teas has been fairly well maintained all through the half-year, but Medium Teas have suffered in consequence, and have shewn exceptionally good value to buyers, particularly during the months of May and June. Fine Teas have commanded good prices all along. One of the chief features of the Sales has been the price of Dust, which during the latter part of the half-year rose to 26 and 27 cents, having been bought by Russian Firms for shipment to China, to be manufactured into "Brick" Tea.

Green Tea.—There has been a material increase in the quantity manufactured, viz., as per Thirty Committee returns 1,414,391 lb against 677,887 in 1901. The prices for this class of Tea have fallen from the good rates ruling early in the year, but the demand at present quotations is good, having apparently been stimulated by the reduction in price.

PLUMBAGO opened the new year with a sharp recovery in value, and a considerable amount of business was transacted at these higher prices, chiefly in the direction of the United States of America, which have taken about 3,000 tons more than during the same period in 1901. The advance has since been lost to a great extent, except for best kinds; these seem to be scarce and are fairly, firmly held for price. Exports amounted to cwts. 264,804 in 1902, against cwts. 187,437 in 1901, and nearly reached the record figure established in 1899. Evidently mining operations are stimulated by higher prices, as the increased quantities exported could have hardly all come out of local stocks.

CINNAMON.—This trade has been dragging. Values have kept fairly steady and are practically unchanged.

The exports during the six months amount to :—
Quills 749,059 lb against 789,822 lb in 1901.
Chips 742,618 „ „ 649,845 „ „

Products of the coconut palm show the following exports ;—

	1902.	1901.
Coconut Oil	cwt. 168,148	cwt. 155,810
Copra	„ 115,119	„ 135,940
Desiccated Coconuts	lb. 5,565364	lb. 6,907,531
Poonac	cwt. 67,505	cwt. 51,937
Coconuts	nuts 7,542,186	nuts. 9,170,807

COCONUT OIL.—The United Kingdom and India continue to take the bulk of our production, but lately an increased export has again sprung up for the United States of America.

COPRA exports have slightly fallen behind.

Prices have been very high all through the six months for both oil and copra, and although they have dropped somewhat, they must still be considered highly satisfactory to those that have invested in coconuts.

POONAC exports are higher, in sympathy with the increased export of oil.

COCOA keeps about up to last year's quantity shipped :—

1902 cwt. 26,020 } first six months.
1901 „ 28,532 }

Prices have experienced a drop and the business in this article seems to have been dull.

Mr. Renton, the Tea Commissioner for the Continent, has suggested a different mode of preparation for the Continental Markets, and if this hint is being acted upon by planters, it may lead towards our product coming more into favour there and ensuring a better price.

CARDAMOM shipments are considerably ahead of last year;

314,138 lb. against 248,252 lb.

and prices have suffered a considerable drop since the commencement of 1902.

The shipping visiting this port is apparently still steadily on the increase and approximately 10 per cent more than in 1901.

FREIGHTS.—Merchants were startled during the course of the period under review by a combination of the British Ship Owners interested in the business of this Port being formed in England. At first this move was viewed with little favour, local shippers fearing it would naturally lead to an enhancement of freights. However, so far, their apprehensions have not been realised; the combination has been at work now several months and freights are practically what were before.

COTTON GOODS.—Cotton has fluctuated greatly during the period under review, Upland Middling opening at 4 17-32d in January against 5 17-32d at the beginning of 1901, 5⅜d being recorded at the end of April this year and 4 31-32 at the end of June. Futures are quoted steadily lower as far as March-April next, a record American corp being expected. Exports of cloth to Ceylon from the United Kingdom during the six months ended 30th June show a very large falling-off, costs apparently varying much in relation to cotton prices, while local values have been much as they were at the beginning of the year, lines in short-supply doing slightly better, others showing a somewhat weaker tendency.

RICE.—Prices opening in January with R3·45-R3·86 for Soolye receded slowly to R3·10-R3·70 in February, recovered slightly in March and closed firm at the end of June R3·28-R3·50.

The total importation for the six months was:—

1902	.. ..	1,489,957 bags.
1901	.. ...	1,343,440 do.

The local market has been very firm during the past half-year, and this has led to the introduction of inferior qualities to suit the demand for cheap rice for the planting districts.

COAL.—Imports have received a check and have fallen behind last year's quantity.

Cardiff	... ...	180,029 tons.
Indian	... ...	137,229 „
Others	... ...	476 „
	Total...	317,734 „

against 342,625 tons in 1901. With lower prices ruling Cardiff coal has pushed a certain amount of Indian coal out of the market, as steamers are taking by preference the comparatively dearer article and thereby ensuring better quality, saving of labour, &c., which compensates for the difference in price.

EXCHANGE.—The year opened with six months sight credit bills quoted at 1/4 13-32, and Bank demand drafts 1/4 1-32. A temporary advance of 1-32nd took place about the middle of January, but was of short duration, and rates reverted to the former figure and remained steady till toward the end of February, when 1/4 7-16 was again touched for six months' credits. During March-April rates steadily gave way, and six months' credits were freely bought at 1/4 9-32. This

was practically the rate up to the end of June, although at times 1/4¼ was touched. Closing rates were :—

6 months' credits 1/4 9-32
Bank demand 1/3 15-16

The six months' discount rate in London at the commencement of the year was 3/3-16 per cent, and this was the highest quotation during the half-year. It fell to 3 per cent during January, and shortly afterwards reached 2⅝ per cent, the closing quotation being 2/9-16 per cent, the lowest point touched.

Chairman.—It will be necessary to appoint a Chairman, Mr. Stanley Bois' term of office having expired.

Committee.—It will also be necessary to elect two members of Committee in place of Messrs. W. Shakespeare and F. C. Allen who retire by rotation.

Accounts.—The accounts of this Chamber for the past half-year, duly audited, are laid on the table.

Membership.—The number of members of this Chamber is 71, as against 69 in the previous half-year.

AMAZONIAN RUBBER.

TRAMWAY CONCESSION IN PARA.

From Mr Consul Churchill's brief report from Para we learn that the total exports of Amazonian rubber, including that from the States of Para and Amazonas and the Republics of Bolivia and Peru, during the year 1901, stating qualities, quantities and their destinations, were as follows :—

	Europe, Tons.	United States, Tons.	Total. Tons.
Fine	7,949	8,052	16,001
Medium	1,562	1,890	3,452
Coarse	2,557	4,284	6,841
"Caucho"	2,723	1,322	4,045
Total ...	14,791	15,548	30,339
" 1900...	—	—	25,807

Of the rubber exports of Para, amounting to 12,040 tons, valued at £2,659,160, we find that the United Kingdom took 4,609 tons, valued at £1,118, 209, and the United States, 6,679 tons, valued at £1,361,553.

Mr Churchill's report also contains the information that concessions have been, and are about to be, granted for various purposes ; such as improvements to the port and sewerage, but the concession holders must find their own capital. The port will require an expenditure of at least £2,000,000.

Capital will also be required for the conversion of the present tramway system from animal to electric traction. It is understood that the change will take place within the next two or three years. Tramways are very extensively used in Para, and the enterprise should be lucrative.

EDIBLE TUBERS.

With reference to the description of an edible tuber, which we reproduce on our seventh page today and which we had previously referred to Mr. Nock of Hakgalla as one of the most practical authorities on the subject in the island, that gentleman writes to us :—"The edible tuber, *Coleus Copsini*, is a plant I do not know, but from the description it appears to be very much like the 'Innala' or 'country potato' of the Sinhalese, *Coleus parviflorus*, of Botanists, and is a vegetable that I don't think ever likely to be much cared for by the European population. It is, however, a product that should be introduced to the Garden here, and if it should prove distinct from the 'Innala would add one more vegetable for native gardens. Since writing the above I have looked into the last *Tropical Agriculturist* and find on p. 78 a paragraph on *plectranthus* as a vegetable. Plectranthus is only another name for Coleus and the very specimen, named in the accompanying slip, is called *P. Coppini*, so my view at first still stands good. We should have it, but I have not much faith in its ever becoming a favourite or taking the place of the potato."

A NEW EDIBLE TUBER.

COLEUS COPSINI.

[By Edward Heckel, in the "*Agricultural Gazette* of New South Wales.'

A good deal has been written lately on the Ousounifing and its tubers, the use and cultivation of which are steadily increasing in the French tropical colonies. It has been incorrectly called Plectranthus Copsini ; but, judging by the structure of the stamen, it is really a coleus. Being a new species, it is as well to give it definitely the name of Coleus Copsini. Some deficiency still exists in the history and knowledge of this plant and its tubers, particularly as regards the chemical analysis of the latter. I have thought that it might be of interest to give the results of the researches made by my friend, Professor Schlagdenhauffen, of Nancy, at my request, using the tubers from the last crop, of November, 1901, raised in the Colonial Botanical Garden at Marseilles. It is a very remarkable fact that this Soudanese plant will pass through all its stages of development in our short summer season of about four months.

From this fact, and also because it has not a name indigenous to the Soudan, I am persuaded that it originates in Abyssinia, like a great many more edible tubers belonging to the same class, Coleus. Beside this it resists very well the cold of the early part of November, and the first tubers introduced from the Soudan flowered early in October in Marseilles in the open air, producing fine heads of blue flowers, which only the cold of the end of November withered before they had turned into fruit; but each year I have obtained from eighteen to twenty stems; six to seven tubers per stem. These were heavier and larger in 1900. It would thus appear that cultivation favours the improvement and development of these tubers, and I intend to continue my experiment with the view of cultivating the plant in the southern districts of France. Another reason for this is that the results of the chemical analyses and culinary uses made by professor Schlagdenhauffen of the tuber encourage its introduction as human food—for cultivation, at any rate, in our southern districts.

We shall see from the analysis that the tuber contains fatty substances, is rich in starch, glucose and saccharose. It certainly contains but little albuminous matter, but is, nevertheless, a perfect food.

Its taste when cooked is very agreeable, resembling that of Japan Crosue, or salsify, while it is richer in alimentary equivalents than either of these legumes.

In a somewhat dry lot of 30 tubers were found five or six weighing 0·015 lb ; eight about 0·012 lb ; three to two 0·007 lb; and the remainder about 0·005 lb (This would amount to, say, 66 to 250 to the lb.)

The largest were 1⅝ inch long by ⅝ inch thick ; the average were between 13-16th inch long by ½ inch thick, and the smallest were ½ inch long by ¼ inch thick.

In a fresh state they contain nearly 80 per cent of water. They dry very quickly, and after being exposed to the air for some days they shrivel, and only show about 75 per cent of moisture.

When the dark brown or black skin is removed, they are white at first, but darken in a few moments;

moreover, the knife used turns black, which is an evident proof of the presence of a good deal of tannin, not only in the skin, but also in the body of the tuber. This, when stripped of the skin and thoroughly dried, has the appearance of a chocolate-coloured and very hard substance, which can be reduced to a fine powder by a pestle. This powder is submitted to the action of either, of petrole, chloroform, alcohol and water, then the residue is calcined to ascertain the weight of the ashes, and the percentage of cellulose and ligneous matter can then be calculated.

Successive analyses gave the following results as to the composition of these tubers:—

	Per Cent.
Fatty matter	2·50
Glucose	0 68
Saccharine	4 67
Not defined	·35
Gum and pectic matter	65 05
Albuminous substances ..	78
Starch	4 00
Ashes	4·26
Cellulose, ligneous matter and loss	40·71
	100·00

The ashes consist of sulphates, phosphates and carbonates.

The weight of the potash is 2·49 per cent, and of the soda 1·34 per cent.

These tubers, as is well;known, replace in French tropical colonies the potato, which does not produce any tubers, but grows all into leaf. In the Soudan they are very much appreciated even by Europeans. When the tubers are scraped in the fresh state their odour is very much like that of potatoes. A very simple way of cooking them is to immerse them in nearly boiling water for 20 minutes, when the black skin can be easily removed, and the fleshy part which remains is white. Add a little chopped parsley, butter and seasoning and serve hot. Prepared thus, they have a most agreeable taste, resembling that of Crosne of Japan, or salsify.

Note.—This appears to be a plant worthy of trial in Australia. As M. Heckel points out it is probable that with cultivation the tubers may be greatly increased in size. In some of the arid western districts potatoes can only be grown with difficulty, and this tuber may in time prove a good substitute for them. As a crop for pigs also there should be a future for it.

THE KLANG COFFEE CULTIVATION COMPANY.

PARA RUBBER GROWING SUCCESSFULLY.

The yearly meeting of the Klang Coffee Cultivation Company was held yesterday afternoon at the office of the Company, Weld Quay. The Directors consider the past year's working satisfactory, and the future prospects certainly favourable. It has been decided to plant up the whole Estate with Para rubber, but this will not interfere with the coffee for at least four years, when it can be decided which product it will pay best to continue cultivating. The Para and Rambong trees previously planted are growing strongly, and an experiment was made about four months ago in tapping three Para trees three years old, which yielded some ¾ lbs. good rubber valued in England at 3s 2d per lb.—*Penang Gazette*, Aug, 19.

THE OLDEST PARA RUBBER TREE IN PENANG.

Mr C Curtis, F L S, has been writing on "The Penang Gardens Rubber Tree." The tree in question is one of about two dozen young Para rubber plants which were received from the Singapore Botanic Gardens towards the end of 1895 and planted out in the early part of 1896. It so happened that the tree in question was planted in poor gravelly soil on sloping ground, which, by the subsequent cutting of a road, converted the site into a dry bank. Hence the tree cannot be said to have grown up under the most favourable conditions. When the tree was some ten years old, the question of the best method of extracting coagulating rubber, and the probable yield, commenced to interest the planting community, and this tree, as being the largest in the Penang Gardens, was selected for experiments which have been carried on from time to time. In June 1897, when the tree was approximately twelve years old, it was thirty-six inches in circumference at three feet from the ground, and yielded one pound of dry rubber. In November-December of the next year the yield was three pounds; April-May, 1899, two pounds, eight ounces; November-December, 1899, three pounds, four ounces; October-November, 1900, three pounds, twelve ounces; and in August-September, 1901, when the circumference of the tree was sixty-six inches and its height about fifty-five feet, the yield was two pounds, two ounces. Mr Curtis points out that the interest in this particular tree lies in the fact that it has been tapped successively six times, from the eleventh to the fifteenth year of its age, that it shows no signs of deterioration and that the incisions made are all healed up. Since December, 1900, its growth has been slow, the present circumference of the main stem being only sixty eight inches; that is an increase of only two inches in a year and a half. Mr Curtis is of opinion that probably, under existing circumstances, this tree has almost attained its maximum size. He also states that one hundred such trees could be grown to the acre without being too crowded. It will thus be seen that the average yield per tapping amounted to two pounds eight ounces, so that at this estimate, and taking the price of rubber at three shilling per pound, an acre should produce a crop valued at thirty-seven pounds ten shillings at each tapping.—*Pinang Gazette*, August 20.

COCONUT PLANTING IN THE STRAITS.

"Spero," writing in the *Straits Times* of August 21st, says:—May I ask if any of your readers can inform me whether or not coconut cultivation is considered to be on the increase in the Native States? One seems to hear more about it than one did, but perhaps it is not so much of the coconut tree itself, as of its enemies. My attention was drawn to this subject by an old friend of mine at home, who read in a recent issue of your paper the following statement—(copied, he said, from a Report of the Federated States United Planters' Association):—"Coconut planting does not increase in favour owing to the ravages of the beetle and the cost of keeping the trees clean". The above statement, as quoted, implies that the expenses entailed have been found to hardly warrant much attention being given to the cultivation, and, if this be the case, it must be very disappointing to those of the planters who, under the inpression that coconuts had stood the test of hundreds of years, and had always been considered a sound investment, chose this form of agriculture in preference to those more speculative. My correspondent goes on to say, "surely trees which are scrupulously kept clean, and under constant supervision are in less danger than others;" there would seem to be a good deal in this argument. I am told that the Government is trying hard to enforce the Coconut Enactment as regards the holders of native plantations where a great part of the trouble must surely lie. But it is not on the

results from native holdings that the Planters' Association are likely to frame their reports. Thus it would be interesting from the would-be investor's point of view, if from no other, to ascertain the extent to which European cultivation has suffered by the "ravages of the beetle" to warrant the Planters' Association taking such a gloomy view of the situation. It must occur to the least observant that the prominence of such statements without more detail is hardly calculated to bring the cultivation in question into further favour, and in the Native States there must be many who have a large interest at stake.

"FORCED" PLANTAINS.

Mr. C J Stracey, in your issue of the 20th inst., refers to the statements of "A Correspondent" on "forced" plantains which appeared in your columns a short time ago, and says the practice of artificially ripening the half-green fruit "has not been discovered to produce deleterious effects on the consumers." He admits that this process robs fruit of its freshness and flavour, but he thinks that the practice is defensible so far as the ryots on the Lower Pulney Hills are concerned, owing to the desire they have to get a quick and regular sale for the fruit they so extensively grow. The question is not whether the plantain ripened by an artificial process is deleterious to the consumer but whether it is really worth spending money on it in its deteriorated condition. If this process destroys the freshness and flavour of the fruit there can be no real pleasure in buying and consuming it. Europeans are chary of eating the soft, pulpy, flavourless, artificially-ripened plantains sold and are greatly provoked when such are placed before them on the table for consumption. The people of India are not so careful and often eat fruit in a semi-decayed state, which may sometimes be the cause of bowel complaints. The article on "forced" plantains has already taken effect. I know of several Europeans who have taken action since they read it and ordered their cooks not to bring artificially ripened plantains any more. I have heard of complaints made by consumers about the unsatisfactory nature of the plantains put nowadays on the Madras market. They cannot understand, they say, why plantains have such an altered taste. My article has now enlightened them as to the cause of this. Plantains come from various parts of South India to the City for sale, I understand. My counsel is that, if Madras purchasers would sternly resist such an indefensible method of ripening them and refuse to buy them, the growers and the retail dealers would soon be brought to their senses and put only naturally ripened plantains on the market. This would set an example to the whole of South India, and to the fruit-growers on the Lower Pulneys in particular, who evidently are much to blame in openly carrying on the practice. A great future lies before the plantain, not only because of its fruit but because of the fibre which can be extracted from the stalk and made into ropes. Some of the finest and strongest ropes can be made from certain species of plantains, which, if cultivated for fibre as well as for fruit, might become a source of wealth to the ryots of the Presidency. Thousands of plantain stems are cut down and thrown away as worthless, if they cannot be utilised as leaf-plates. The waste in fibre by this action, and the consequent loss in rupees must be very great. If plantain growers were taught how valuable the plantain stalk is in fibre, and if they would avail themselves of the fibre-extracting appliances which can be procured cheaply, they would benefit themselves to a large extent. They might grow the *Musa textilis*, which is the plantain so extensively grown in the Philippines. This plantain is well-known in India. It is called in Tamil *Peyan vazhai*, or the "demon plantain,"—*Madras Mail*, Aug. 25.

FRUIT PULPING.

An account is given in the Annual Report on the Saharanpur and Mussoorie Botanical Gardens of some experiments made in the new Californian industry known as fruit-pulping. The idea is to boil down the fruit until it has assumed a semi-solid condition and then evaporate the remaining moisture, so that the pulp can be wrapped in oiled tissue and packed in an ordinary deal box. Experiments were made with peaches and mangoes, but the result was not encouraging. One hundred and fifty peaches, weighing 19¼ lb produced 2 lb of dry pulp, costing 12 annas per lb, without counting the cost of stoning the fruit, boiling, straining, evaporating, putting up the bricks in an atractive form for sale, etc. Thus the cost of producing peach-pulp bricks is at least Re 1 per lb; and as the better class of peaches sell readily Rs 2 to Rs 3 per 100 and second-rate fruit at Re 1 per 100, it would not be worth the time and trouble of growers to adopt the pulping system. Moreover, it was found that the pulp-bricks would not remain hard and solid for more than a few days in the moist climate of the rains.—*Madras Mail*, Aug. 25.

THE COCONUT PEST IN THE STRAITS

Mr E V Carey writes from Klang to the *Malay Mail* as follows:—As instancing the danger of having any sort of rubbish lying about an estate, or in private compounds, the following little anecdote may be of interest. Some four months ago I had to discard a number of old sacks; these were thrown in a heap on the ground, covering a space just six feet square, and left there. Last week I have happened to notice them, and stood by whilst they were being removed. From this one little heap no less than 201 larvae of the rhinoceros beetle were collected. I am sorry for the *one*, but this is a true story, so I can't very well leave him out. Moral let every one keep his grounds scrupulously clean, and have even the insignificant and harmless-looking collections of rubbish promptly burned.

THE USES OF CASSAVA.

In the *Cosmopolitan*, Mr. Packard points out the astonishing agricultural possibilities of cassava, better known as tapioca. It is a bushy shrub growing to about five or six feet in tropical and sub-tropical climates,

and its roots produce more starch per acre than any other vegetable or grain. In South Alabama, Mississippi, Georgia and Florida its cultivation is spreading with great rapidity. It thrives best in the light sandy soil which before was thought not of much worth. The average yield of the roots gives eight tons to the acre. The starch from these roots costs only 24½d per lb., and it is said to be far superior to wheat starch at 3d per lb. The gain in using cassava for fattening animals, as compared with the old methods, is stated to be about 30 per cent on a seventy-day test. Hitherto artificial fertilisers have been used for cassava in America, but now it is found that several kinds of beans and peas growing freely in the regions where it is cultivated form perfect natural fertilisers for it. Tapioca is cultivated in the Straits Settlements, and would no doubt thrive equally well in many parts of India.

GEM-MINING IN QUEENSLAND.

has latterly attracted considerable attention, and with the view of obtaining some accurate information respecting the condition and prospects of this branch of the industry, it was considered desirable that an examination of the Queensland sapphire and opal fields should be made by persons specially qualified for the task. Accordingly Mr B Dunstan, Assistant Government Geologist, was deputed to visit the sapphire fields at Anakie in the Clermont district, and to Mr Jackson, also of the geological survey staff, was assigned the duty of inspecting the opal centres of the State from Cunnamulla to Winton. With respect to sapphire-mining at Anakie Mr Dunstan says that only a small portion of the extensive tract of sapphire-bearing country has been explored, the principal camps being confined to an area not exceeding 10 square miles. The sapphire deposits are found in much the same manner as shallow alluvial gold or tin, and vary in thickness from a few inches to several feet. The stones are blue, yellow and green, of numerous tints and shades, the green and yellow being the most beautiful. The yellow stones are rare, and the blue are of so dark a shade as to appear almost black, and cannot compare with the brilliantly tinted stones of Siam, Burmah, or Ceylon. Green stones, uncommon in other parts of the world, are found in abundance at Anakie, and their comparative rarity and frequently great beauty have created a growing demand for them. Amongst other stones found at Anakie is the hyacinth which, when cut, forms a richly coloured gem of a deep blood-red colour, and the Oriental cat's-eye, rejected as valueless until the skill of the lapidary disclosed the peculiar lustre that is occasionally very marked and effective. More important, perhaps, was the discovery that the sapphire deposits are also diamentiferous, and one diamond weighing 1¼ carats, and absolutely colourless, was purchased by Mr Dunstan, and is now to be seen in the Geological Museum.

Mr Dunstan estimates the number of persons engaged in gem-mining at Anakie at the time of his visit to be 200, and the warden sets down the value of last year's output from the field at 6,000*l*.

The production of opal in 1901 was estimated at 7,400*l*.—*Board of Trade Journal*, August 7.

PRODUCTS AND TRADE OF JAVA FOR 1901.

The year 1901 can scarcely be regarded as prosperous for the Island of Java. Against a large sugar crop, there was a falling-off in the production of coffee, rice and coprah, while the import trade left much to be desired.

The Coffee crop was very small. On the eastern side of the island the trees suffered a good deal from the effects of the eruption of the Kloet. The mu streams destroyed a few estates, and others were injured by falling stones and ash, and the blossom, then very nearly coming out, was more or less ruined. Government have abolished the export duty, which amounted to about 10d per 112 lb., and this may assist in resuscitating the culture. The production of the coffee crop from private estates in Java last year was 175,000 piculs Java and 118,250 piculs Liberia, while next crop is estimated at 389,500 piculs Java and 93,600 piculs Liberia. The Government crop was again small, amounting to 78,200 piculs Java and 30,417 piculs Liberia coffee.

Quinine.—Notwithstanding the increased monthly shipment of cinchona bark from Java to Holland during 1901 prices realised were satisfactory. The quantity of sulphate of quinine produced by the Bandong factory and sold at auction in Batavia during 1901 was 1,014,000 ozs. (English). The average price paid was 1 1-10th d. per oz., the equivalent of 1 7-10th d. per unit. The bulk of the quinine was shipped to the United States and London.

Tea.—The season's production exceeded any of its predecessors. The export has almost entirely been shipped to Holland and London, though regular small parcels of specially-prepared tea have been forwarded to ports in the Persian Gulf. Attempts are being made by Java planters to prepare their tea in tabloid form, which is considered in some quarters to be most suitable for the markets in Russia.

The Copra crop was much interfered with by rain, and was consequently below either of the two preceding years as regards quantity. Prices have been unprecedentedly good.

Fertilisers.—Large quantities of sulphate of ammonia and blood manures from the United Kingdom and the colonies continue to be used all over the island. Groundnut-cake from the Madras coast and bean-cake from China also find much favour, and the imports of all kinds are increasing.

Oil.—The prospects of an increased business being done in liquid fuel have not so far been realised, but a considerable number of local industrial undertakings use this fuel in preference to coal.

Consul Davids.

MICA PRODUCTION IN 1901.

In the *Iron Age* (New York) of the 17th ult. it is stated that the United States' Geological Survey has completed the report upon the production of mica in the United States in 1901, from which it appears that the total output of sheet mica during that year was 360,060 lb, valued at 98,859 dols, and of scrap mica 2,171 tons (of 2,000 lb), valued at 19,719 dols. In 1900 the production of sheet mica was 456,283 lb, valued at 92,758 dols, and of scrap mica 5,497 tons, valued at 55,502 dols. Mica has been found in many of the States, but in 1901 was produced only in New Hampshire, New Mexico, North Carolina, and South Dakota, by far the larger amount being obtained from North Carolina.

The production of mica in 1901 in detail was as follows:—New Hampshire, 65,800 lb of sheet mica and 255 tons of scrap mica; New Mexico, 3,100 lb of sheet mica and 140 tons of scrap mica; North Carolina, 266,160 lb of sheet mica and 1,775 tons of scrap mica; and South Dakota, 25,000 lb sheet mica; total, 360,060 lb of sheet mica and 2,172 tons of scrap mica. Idaho, Maine, Nevada, Rhode Island, and Virgina, which were producers of mica in 1900, had no production during 1901, and of the other States, with the exception of North Carolina, there has been a very noticeable falling-off in the production. In North Carolina there was a decided increase in the production of plate mica, but a large falling-off in the production of scrap mica.—*Board of Trade Journal*, August 7.

COLOURED AND UNCOLOURED GREEN TEAS.

(TO THE EDITOR OF THE "HOME AND COLONIAL MAIL.")

SIR,—I notice in your issue of July 18th that you have published a letter to me, from my old friend, Mr Hart, on the subject of finished and unfinished green teas. He is of opinion that the Canadian buyers will consult their best interests by using at once the teas he recommends, the finished article. My reply, copy of which is attached, states the case for Canada, and explains why the finished teas cannot be used at present) —Yours faithfully, ROSS W. HAYTER,

50, Front Street East, Toronto, July 28, 1902.

Robert Hart, Esq.,

Sir,—Thanks for your letter on the subject of finished and unfinished Greens from India and Ceylon. We are not in a position yet to go into questions of the relative merit and quality of the "finished" article, as it is only during the last month that any samples of finished Greens from India have been shown. It may be, as you say, that they are superior and will fetch higher prices. This may happen when they become known and have been well advertised, like uncoloured green Ceylons have been. At present the Ceylon and Indian Greens that are wanted in Canada (I speak for Canada only) are the "unfinished" (to adopt the proper title) Ceylon Greens, and have been extensively advertised as such, as distinct from the coloured teas of Japan and China. They have got a firm hold of the public taste here. The reason is quite evident. When Mr Larkin and Mr Mackenzie undertook to push Ceylon Greens, the "finished" teas you are now making were unknown here, all the Ceylon and Indian Greens being of the "mamuna" type, and some of them excellent in both style and cup, brisk and pungent, and better than the finest Japans that can be bought here, and with plenty of the character that is wanted in Canada, which is, after all, the main point. In fact they have proved to be quite suitable. These are the teas that at a tremendous expenditure of energy and money on the part of Mr Larkin have got established, and, unless the supply of the "unfinished" type falls off, as you seem to think it I may, I predict that it will hold its own for some time to come. The public here have been educated up to the appearance, and are shy of a Ceylon Green that looks green, suspecting colouring matter. The keeping qualities, too, are all right. I have some that I have had nearly a year, and they are perfectly sound whereas a black tea would have gone off.

The motives you attribute to buyers here for using these teas is hardly a fair one. They had to use them or none, as there were no "finished" teas available when they commenced to push them, and the great point in advertising these teas is that they were natural uncoloured teas. You will understand, therefore, that Mr. Larkin takes but a small interest in these "finished" greens, so far as his own business is concerned, although he takes interest in them from another point. He can get gardens in Ceylon to make as much of the sort he requires—or as much as Canada requires—without much trouble, and also at the prices Mr. Larkin and others are prepared to pay.

There will no doubt be a market for both sorts as time goes on, but it will be some time before they get in here and displace the unfinished type, which has got a three years' start. I don't wish you to think that I am extolling the merts of "unfinished" greens as against the "finished," for I have had no opportunity yet of forming an opinion; what I want to make clear is that for Canada at present (for the reasons before stated) the unfinished teas are what as wanted both as regards appearance, cup quality and price. They beat the Japans used in Canada on all points, prices not being the least important.—Yours faithfully, ROSS W. HAYTER.

50, Front Street East, Toronto, July 28, 1902.

NOBODY'S BUSINESS.

(To the Editor of The Home and Colonial Mail.)

SIR,—It is satisfactory to see that some interest is being aroused in the extension of the use of China tea among those who are prepared to pay the highest prices—in the tea-room of the House of Commons and also among our richest consumers. Imperialism only interests itself in those who protect themselves, i.e., self governing colonies. Regarding reversion to China teas the cause is not far to seek. The blenders catering for the masses provide an article in which strength, more than ever, is the chief consideration. What those who are prepared to pay highly require is a good flavouring tea with most of this pungent character eliminated; substituting in its stead a brisk, light, flavoury tea. The masses will for the present stand by the stronger compound; unless they, as is so often the case, imitate their betters. Nor am I sure that 30 per cent of the public really care for strength in preference to delicacy of flavour. Fifteen years ago, when Ceylon teas so successfully and exclusively won the markets, they were thin and flavoury; and I well remember going round dealers' tasting rooms and being assured that, notwithstanding the public approval, they and some Indians were fetching far above the value put upon them by specialists. Having both Ceylon and Indian investments, I am writing in the interests of both, and am convinced that a delicate, light, brisk, pleasant tea of flavour can be blended from British-grown teas, as acceptable to delicate palates and as satisfactory to the doctors as anything China can produce. It would also be able, strength for strength, equally to bear with China tea the test in the laboratory. The one great evil of the ordinary pungent blend of commerce is that it is inclined to be "leathery", if drunk weak. Darjeelings, Ceylons, and some Dooars, and many other gardens from various districts could, by lighter rolling and brisker firing, produce an article which would please a finer taste and reassure the doctors. If this question were as fully advertised as Ceylon teas were fifteen years ago it would, as then, soon become the fashion now, as it became then.—I am, Sir, yours, &c., W. FORBES LAURIE.

—*H. and C. Mail*, Aug. 15.

MANURING TEA.

Mr Henry M Alleyn, the Ceylon planter to whom we owe a new system of plucking, which has been very largely adopted to the advantage of Ceylon gardens, favours us in this issue with his views on manuring, a subject which Indian planters would do well to study, as it is the backbone of the industry in many parts of Ceylon. Mr Alleyn pins his faith to manuring for quality, and we may state here that he has applied in India and Ceylon for patent rights in a new mixture of this own composition, with which he claims to effect the object of improving quality in tea manufactured.—*Indian Gardening and Planting*, August 28.

PAPER BUILDINGS.—The *Paper-makers' Monthly Journal* reports that a Russian nobleman has upon his estate at Savinowka in Podolia a paper house of sixteen rooms, built in New York, at a cost of 80,000 roubles, and its architect declares that it will last longer than a stone building. Bergen, in Norway, has a church built of paper capable of seating a thousand people.

PLANTING NOTES.

THE "TRUE GREEN TEA."—Messrs. Wm. Jas. and Hy. Thompson's tea circular, dated 31st July, has the following:—

"It has now been proved possible to make in India and Ceylon, without artificially colouring the leaf, the true "Green tea" of commerce, with pure and delicate flavour, and also the distinct variety called "Uncoloured tea," each so attractive in quality as to almost ensure a market provided a regular, abundant and uniform supply of equal value can be guaranteed. We entirely confirm what we wrote on this subject in our annual review."

RUBBER EXPLOITING IN PERU.—A report by the United States secretary of legation at Lima, Peru, in regard to the formation of two rubber exploiting companies was referred to in The *India Rubber World* of June 1[page 280.] It has been learnt that the company with £26,000 capital, to operate in the province of Sandia, department of Puno, Pero, is the Tambopata Gum Co., organized by Señor Pedro D. Gallagher, of Lima The new company to take possession of 50,000 acres of rubber lands near Marcapata, in the department of Cuzco, and east of the city of that name, was organized by Don Manuel Elguera, also of Lima, and a brother of the mayor of that city. It was Señor Elguera, by the way, who secured the concession in the Béni country, in Bolivia, now being exploited by the Andes Co., of Baltimore, Maryland.—*India Rubber World*, Aug. 1.

SEEDS FOR INDIGO PLANTERS.—In the *Natal Mercury* of July 4th it is stated that a possible new industry of considerable interest is in front of Natal. Mr A M Baily, accredited by the Government of India, and also by the indigo-planters in that country is at present in the colony making inquiries in regard to the indigenous indigo-plants of Natal, with a view to obtaining a large supply of indigo-seed for the use of Indian planters. It is probable that some hundreds of tons of the seeds will be required every year. It is suggested that this would be a valuable crop to grow in Natal, for seed purposes if for no other. The yield of seed for plants growing six feet apart is stated to be about one pound per plant, or 1,210 pounds per acre. The present price for the seed is 1s 6d per lb.—*Chemist and Druggist*, August 16.

MOZAMBIQUE.—There is a considerable falling-off in the value of the exports during the past year. These consist of groundnuts, copra and a small quantity of ivory and calumba root. Formerly india-rubber was despatched in important quantities to Hamburg and elsewhere; but the export of this valuable commodity was stopped in the early part of this year, the authorities stating that, owing to the admixture with the rubber of foreign bodies for the purpose of increasing its weight, it was acquiring a bad reputation on the European markets, and that until such time as the collectors of the juice could find means to procure a rubber calculated to create a demand for produce of this country, no more should be despatched. Naturally, this somewhat arbitrary order had a disastrous result, for many of the traders, who had accumulated large stocks, found themselves unable to put their produce on the market. The Governor-General has now withdrawn this prohibition—*Gutta-Percha Trades' Journal*, August 4.

PERU.—The india-rubber industry is likely to progress, as from all accounts the forests of Peru contain innumerable rubber trees. From July 1st, 1900, to July 30th 1901, grants amounting in the aggregate to 1,240,000 acres of forest land, said to contain valuable rubber trees, have been made by the Government. These lands lie in the Departments of Huanuco and Cuzco. The periods of grants are either five or ten years. The royalty claimed by the Government is 2s for every quintal of rubber which is exported. During the same period six other concessions were granted under somewhat different conditions. One of the grants comprised 4,942 acres and others 1,235 acres each. These grants are divided into plots called "estradas." Each "estrada" contains within its boundaries 150 rubber trees. The royalties levied in this case are 20c annually for each "estrada" and 20c for each hectare of land which the estradas cover.—*Gutta-Percha Trades' Journal*, August 4.

TEA IN INDIA AND CEYLON.—Says "*Indian Gardening and Planting*," September 4th:— "In respect of the acreage figures it should be remembered that the procedure of the planters in the two countries is different. In India when land gets worn out, it is customary to extend and plant fresh land. This has been somewhat contemptuously styled a *jhuming* policy. But so it is; the old land produces little, still it is often kept up and swells the nominal total of acreage in cultivation. In Ceylon the practice is to make the most of existing cultivation, by forcing manure, which keeps up the output when the soil flags. Yet not content with thus forcing output of tea from old land, the Ceylon planters have gone ahead faster than the Indian in the typical Indian system of extension, for which the *Ceylon Observer* seeks to blame us." [Not so, we maintain, India in four years planted 17,000 acres more than Ceylon; and there has been no planting here at all for two years; while nearly all Indian Tea Company Reports up to this date, speak of "extensions."]

CACAO-PLANTING IN DOMINICA.—Mr. G. W. Penrice writes to *The Times* in a very cheery way of this island. He says:—

It is very probable that newcomers landing at Dominica will be told that the Crown lands are no good, and may be advised to buy ready-made places on the coast, where the labour of clearing and preparing the land for planting will be avoided, but this advice should be ignored, for although the land on many of the coast estates is still very fertile, it is not to be compared to the virgin land in the interior. Some of the cocoa trees which I planted 18 months ago on my property are quite equal in size to many trees that I saw on some of the plantations on the coast, and which I was told had been planted three years. Of course, the taking up of Crown land entails a certain amount of roughing it during the first year, as it takes some time to erect dwelling-houses, &c., but these discomforts become things of the past and are soon forgotten. It is not advisable for any one to go to Dominica with the intention of planting unless possessed of at least £2,000, but given this sum, together with the exercise of some tact in the management of the natives, success must follow.

India Rubber.—The India Rubber Industry is one of the most remunerative in Russia, and is conducted by wealthy companies. British dealers in the product should bear this in mind and afford every facility to purchasers of the commodity in question.—*Board of Trade Journal*, Aug. 14.

Rubber in the Straits.—We are much indebted to Mr, F Pears for his letter in correction of our estimate of the area under rubber in Johore, which he would raise from 200 to at least 1,000 acres. We had less information about Johore than any other division of the Straits; but we would like to hear from residents in the other States as to our figures, which ran as high as 2,926 acres for Selangor.

Tea Growing in America.—America persists in her attempts to grow tea. According to the *American Grocer* of the 30th July "Texas is to have a tea farm at Port Lavaca. A start has been made with 500 plants. This is in line with similar experiments made fifty years ago." In the same journal we read the following:—"Sinko Hatto, on behalf of Japan's tea interest, has been appointed by his Government to make a thorough study of the tea-growing conditions in South Carolina."

The Mungpo Cinchona Plantation.—Dr. Stuhlmann, Director of Agriculture in German East Africa, has reported upon various Indian products; among others upon Cinchona. As he says, the bark is chiefly cultivated by the Government. He deals specially with the Mungpo plantation, near Darjeeling, where an area of 40,000 acres is reserved. About 200 acres are planted with cinchona every year, so that about 1,500 acres are always occupied by this product, the trees being only maintained for about eight years, then rooted out and the ground left to rest. One plot has, says Dr. Stuhlmann, been resting for 15 years after producing a crop of *Cinchona succirubra*, and it will still be necessary to manure with bone dust before planting *Ledgeriana*. Wherever the soil is suitable *Calisaya, var. Ledgeriana*, is preferred but it requires good drainage. *Officinalis* does not succeed at Mungpo.—*Planting Opinion*, Aug. 23.

Bananas—are now-a-days quite common objects of merchandise, and to a certain extent the banana peel has ousted the no less dangerous orange peel as a trap for the unwary in the London streets, but now the fruit will probably become even more common, for an agreement of considerable importance to Jamaica has just been entered into between Messrs. Elder, Dempster & Co. (Imperial West India Mail Service) and the United Fruit Company of Boston. The Direct Mail Company are under contract with the Government to run a fortnightly service of steamers, and to bring over from Jamaica 20,000 bunches of bananas by every steamer. Sir Alfred Jones has all along been anxious to make the service a weekly one, but the supply of fruit on the south side of the island was insufficient. This difficulty has been overcome by the agreement with the United Fruit Company, which does most of its own fruit farming, and undertakes to supply the extra steamers of the British line, which are to run from the northern side of the island to Manchester.—*Grocers' Journal*, August 2.

A New Weed-cutting Machine.—A Ceylon official is good enough to send us the extract from *The Field* on this subject which we reproduce elsewhere and to ask:—"Would not this be worth trying on the Colombo Lake?"—We commend the extract to the attention of the Chairman and Members of the Colombo and Kandy Municipal Councils—and also of the Local Board, Nuwara Eliya, where Lake Gregory is being steadily encroached on by vegetable growth, weeds, rushes, &c.

Java Tea.—As foreshadowed in the British Consular report for 1900 the season's production of Java tea in 1901 exceeded any of its predecessors. The bulk was almost entirely shipped to Holland and London, though regular small parcels of specially prepared tea were forwarded to ports in the Persian Gulf. Attempts are being made by Java planters to prepare their tea in tabloid form, which is considered in some quarters to be most suitable for the markets in Russia. Statistics of Exports for the last four years are as follows:—

1898	..	12,110,724 lb.
1899	..	12,841,702 lb.
1900	...	15,406,984 lb.
1901	...	16,750,872 lb.

Planting Opinion, Aug. 23.

Destruction of Pests.—There has just been issued from the Agricultural Department at Ottawa a valuable pamphlet whose title runs thus:—"Agricultural College, Bulletin No. 122. Spray Calendar—directions for treatment of insect pests and plant diseases. By W Lockhead, Professor of Biology and Geology, Orleans Agricultural College, Guelph. 1. Thorough intelligent spraying pays; 2. Spraying is a insurance; 3. Clear up refuse, gather up fallen leaves and fruit in the fall and burn them; 4. Protect birds and beneficial insects. Published by the Ontario Department of Agriculture, Toronto." There are a large number of recipes for "extirpation," with instructions of the mixing of ingredients, and notes as to how and when to apply them to the affected trees, vegetables; &c. Altogether it is a little work of great value to the market gardener and private grower. Such a work must spare the "Inquiry Department" at Ottawa much work and save much time just when a loss would be of importance. For such a work a large sale might be guaranteed in this country.—*Gardeners' Chronicle*.

Improvement in Coconut Culture.—An old resident writes:—

"It would seem that the coconut does not admit of exploitation to any great extent—being indigenous and apparently unimprovable by pruning and grafting. "Selection" of seed, or "fertilizing" flowers to that end, might do something, but life is short—and a coconut tree is not a gooseberry bush!"

Careful selection of fully-grown, ripe nuts from a good district for the nursery is the only precaution we have heard of. It might be well to experiment in Ceylon with seed-nuts from the Straits or Java. Decandolle puts the Eastern Archipelago, extending up to Sumatra, as the original habitat of the coconut palm, from whence the nuts floated away both to Eastern and Western shores. Experiments in fertilising flowers ought to be tried in the Heneratgoda Gardens, if deemed of sufficient importance. What do Messrs. Lamont, Jardine and W H Wright say to this idea?—Ed, *T.A.*]

A GUTTA-PERCHA EXPEDITION TO THE SOUTH SEA.

The Committee has sent Herr Schlechter to German New Guinea to explore this possession for Gutta-percha. The expedition was a complete success, Herr Schlechter having discovered at the foot of the Bismark Mountains, and elsewhere gutta trees and vines giving an excellent quality of gutta, equivalent to "gutta-merah" and other finer sorts. Samples sent to Germany are now undergoing a detailed technical examination, but we may now feel sure that our cable industry can be provided with gutta-percha from the German colonies. This discovery is the more important as the supply from Northern Borneo and other gutta countries is rapidly declining, at least, for the better sorts. For this reason a Bremen merchant, Herr Oldemeyer, had promised a prize of £150 to the explorer who should find in a German Colony a wild-growing gutta plant giving a good latex. Of course, the prize is due to Herr Schlechter. West Africa is concerned in this discovery. Herr Schlechter has sent to the Botanical Gardens at Berlin cases of young plants from seeds of the newly discovered gutta trees and vines, and these plants are now being submitted to a trial of the West African climate, in the Botanical Gardens of Victoria (Kamerun) and Togo. These countries being nearer to Europe and better suited for plantation than the far-off and ill-developed islands of the South Sea, it would be a great gain if the gutta plants could thrive there.—*Gutta-Percha Trades' Journal*, August 4.

GOLD IN BRITISH GUIANA.

Reuter's agent, writing on July 31st, makes the following remarks :—

Although a British possession with undeveloped wealth of greater magnitude almost than that of the newly acquired colonies of South Africa, it is being left almost entirely to American and Continental capital to exploit it. The conviction has been firmly implanted in the British mind that British Guiana, or Demerara, is a sugar-cane growing country and nothing more, but the mistake of this must be evident when it is mentioned that only a fringe of the vast territory of 109,000 square miles is under sugar-cane—about 150 altogether being cultivated—and the greater part of the interior is as unknown as is the centre of Africa. The United States have just resolved to send parties to explore the interior of Brazil, the neighbouring country, and it is not improbable that this will be followed by a similar expedition to British Guiana. Gold, diamonds and balata are riches which the interior possesses and which at present are being worked with spasmodic efforts. In the case of the first-named industry little real attempt has been made at development, but a German company, known as the Omai Syndicate, have just completed the erection of a large plant to work the gold on up-to-date principles. Negotiations have also been entered into with a Dutch company with a proposed capital of £250,000 to take over and work gold claims in the Barima district. With regard

to the diamond industry, American capital is for the greater part, invested, and splendid returns have been received.—London *Times*, Aug. 15.

COCOA AND OTHER PRODUCTS IN TRINIDAD.

Trinidad, July 30th, 1902.

WEATHER.—We continue to have very favourable weather for all growing cultivation.

PRODUCE.—Cocoa.—The weather has been favourable for the prospects of the December crop. Receipts from the country continue to diminish daily, but, owing to a much less active enquiry, prices locally have declined to a rate more in keeping with prices in European markets and we quote today \$12.90 to \$13.10 for ordinary, and \$13.40 to \$13.50 for good estates grade.

COPRAH.—Some lots have been offered lately, the price still holding at 3c. per lb., which does not correspond with London quotations, the market there being weaker.

BALATA GUM.—London quotations at 1s 8½d. and 1s 9d. per lb. C & F do not encourage local buyers as this article here fetches 1s 9d. per lb. for other markets.—*Trinidad Semi-Monthly Market Report.*

MOSQUITOES, MALARIA AND YELLOW FEVER.

We are indebted to a scientific friend for the translation respecting "mosquitoes and yellow fever in Cuba", which appears in our daily and *T.A.* It is the most striking testimony we have yet seen to the vital importance and utmost practical value of the discovery made by Dr. Ronald Ross. We are all proud that a British surgeon should have been the first to demonstrate the connection between the "wee scoonrels" (of the teased tropical Scot) and fever; but it reflects on our national enterprise that, apparently, our American cousins should be the first, in Cuba, to demonstrate the great and absolute saving of life from putting in practice the lesson taught by the discovery. We know from reports received by us, but not yet read, that Sir Wm. Macgregor, who is M.D., as well as Governor, has not been idle in Lagos, West Africa; but we do not think results like those reported from Cuba have been attained, or we should certainly have seen much made of them in the London press. To have saved 291 lives in six months in Cuba (a hotbed of yellow fever) is a most notable result; and how it has been done can be seen elsewhere. Surely, effective steps should be taken to get rid of mosquito-breeding stagnant pools and drains in several roads of this city in the interests of public health? But still more ought steps to be taken by Government to conquer and kill out mosquitoes in malarial districts where Surveyors, Irrigation and Railway Officers—apart from the natives—suffer so much from fever. After the example shown in Cuba it will be a disgrace if the Indian and Ceylon authorities, to delay any longer to engage in an anti-mosquito campaign.

MADRAS AND WEST AFRICAN PEANUTS.

A CONSUL-GENERAL'S REPORT.

In course of a report on French methods of peanuts crushing, the United States Consul-General at Marseilles gives some interesting particulars regarding Madras and West African nuts. The yield of oil from decorticated peanuts from the Madras coast, which constitute the largest import for the Marseilles soap trade, is from 39 to 40 per cent of their weight. The resultant cake contains from 7 to 9 per cent of oil. The price of the oil depends largely upon the purpose for which it is intended. Oil from Madras decorticated nuts, utilised by soap manufacturers, brings 58 francs per 100 kilograms ($11·19 per 220 pounds) naked, first pressure, delivered at buyers' stores. The finest edible oils are obtained from nuts imported in the shell, these coming from the West Coast of Africa, chiefly from Ruffisque and Gambia. Oils from these nuts are worth from 75 to 80 francs per 100 kilograms ($14·47 to $15·44 per 220 pounds), naked, first pressure. Hand decorticated Mozambique nuts give an oil now worth from 74 to 75 francs ($84·28 to $14·47). The second pressure oil from Ruffisque, Mozambique, and Gambia nuts, which is suitable for illuminating purposes, is worth from 68 to 70 francs per 100 kilograms ($13·12 to $13·51 per 220 pounds). Ground-nut cake brings from 12·75 to 13 francs ($2·46 to $2·50) per 100 kilograms at mills, or 13·25 to 13·50 francs (2·55 to $2·60) delivered f o b Marseilles in bulk, that is to say, without bags. There is usually a difference of 3 francs per 100 kilograms (58 cents per 220 pounds) in this market in favour of ground-nut cakes over cotton seed cakes. The latter are worth delinted, 10 francs ($1·93) per 100 kilograms at mills. Marseilles oil cakes are sold most conclusively for cattle food. The soap mills of Marseilles consume on an average 3,000 to 3,500 tons of ground-nut and other seed oil per month, and about the same quantity of copra and palm-kernel oil.—*M. Mail*, Aug. 27.

MOSQUITOES AND YELLOW FEVER IN CUBA.

(*Translated for the "Ceylon Observer."*)

It has long been a matter of general knowledge that the mosquito is the principal agent in the dissemination of yellow fever and malaria. Since the beginning of 1901 a determined attempt has been made by the Americans to rid Havana (in Cuba) of these noxious insects. Two methods have been used for exterminating them :—first, every house in which there is a case of yellow fever, and the three or four houses in its immediate neighbourhood, are thoroughly fumigated, thus destroying the mosquitoes within them ; secondly, and as a general measure, all standing pools throughout the town and suburbs are either drained or filled up. These pools are well-known to be the favourite breeding ground of the mosquito, the larvæ of which develop in still water from the eggs laid on its surface, and live in that element until their transformation into perfect insects. Sheets of water, which cannot be got rid of in that way, receive a layer of petroleum on their surface. When the larvæ come up to breathe, the petroleum clogs their breathing passages and speedily kills them by asphyxia.

In Havana there is now a staff of 100 men, whose sole business is the destruction of mosquitoes. Already excellent results have been obtained by their agency. Before 1901 yellow fever was permanent throughout the summer. In January there had been 23 cases and 7 deaths. The war on mosquitoes began in February ; and in that month there were 8 cases and 5 deaths, in March 2 cases, in May 4 cases, in June *none*. In September there were 2 deaths against an average of 70 previously. At the same time cases of malaria have sensibly declined in number, which is not to be wondered at, since mosquitoes are the main factors in propagating that disease. In September there were 11 deaths from malaria against an average of 32 up to that month.

In short from April 1st to October 1st, 1901, there were only 5 deaths from yellow fever, instead of 296 [a saving of 291 lives in 6 months!] These figures are eloquent enough in themselves to render comment unnecessary, on our part, upon the good work of the Americans through their vigorous action in Cuba. It is earnestly to be hoped that the example they have set may be followed everywhere.—*From the "Revue Scientifique," April 19th, 1902.*

A CEYLON VIEW OF THE CASE FOR MANURING.

I notice in your editorial of 24th July that you advocate the adoption by India of the manuring systems in vogue in Ceylon in preference to the Indian methods of extension so much practised hitherto. It is unquestionably true that continued extension of a garden to compensate for declining yield merely means increased cost of production per lb. Yet the other system, which, if carried out on certain lines, will give largely increased crops and at the same time often *reduce* the cost of production *per pound* of tea, is not without its disadvantages which are becoming more apparent every day under the increased area operated upon within the last few years. In the first place overproduction is unquestionably increased, and, in estimating the financial return, allowance is hardly ever made for the effects on the market, that immediately result from the adoption of such schemes by any reasonable number of estates—and in tea, where each company knows what its neighbour is doing, such new methods of cultivation cannot be confined to one or two individuals, but are quickly taken up by many others who often look upon the figures shown them as their only salvation.

If an apology were needed for the action of Ceylon in this matter, it is to be found in the fact that with our poor soils the necessity for costly artificial manures is imperative, if estates are not to deteriorate.

It is with present prices impossible to provide the necessary money for such increased expenditure, so that proprietors are driven to employ such quantities and qualities of artificial stimulants as will *greatly* increase the total yield, often by 50 per cent or more and thereby in the cheaper harvesting off the same acreage permit the cost *per lb.* of made tea to remain at the same figure, or under certain circumstances to be reduced.

Yet there is a nemesis that invariably follows such action : firstly in the drop in value of the teas owing to overproduction ; and secondly and more seriously in the slow but steady decline in quality of the crops grown by such means.

This decline in quality so not at first noticeable but in the second and third year generally

becomes very perceptible. It is due to the exhaustion of the soil as regards its available mineral and organic matter by the very much increased network of root growth formed to support the bush stimulated by large soluble supplies of Nitrogen, Phosphoric Acid and Potash manures.

There are other technical reasons, dependent on the character of the measures used, that add to this tendency. As such, however, come under certain discoveries as regards manuring *for quality*, that will shortly be brought before the industry as soon as protection for the invention is secured, they may for the present be passed over.

If, however, India generally is as fortunately situated as Assam, there is no need for the adoption of Ceylon systems of "forcing" or "thorough" cultivation as they are called by those who oppose or who practise these methods of tea culture.

Mr Mann in his report to the Indian Tea Association has treated the question in a most thorough manner. His recommendations, if followed, will insure that the fields are preserved in a first-class state of vigour by the use of *natural* manures, which, though according to the new discoveries they may not directly improve quality, will yet certainly not cause any deterioration therein. The cost of such treatment is also almost negligible and, if similar methods were possible on the steep estates of Ceylon, they would be far and away preferable to any systems of cultivation at present in vogue.

Unfortunately such is not the case. The character of the land and soil in Ceylon is entirely different from the flat alluvial of Assam, while natural manures, except in small quantities on a very few favoured estates, are conspicuous by their absence. That the last word has been said as regards Ceylon methods of manuring is not the case. No industry in these days of competition can afford to remain stationary, and it is almost a matter of certainty that the next few years will see the adoption by Ceylon, and it is hoped by India, of the improved methods of manuring for *quality*, in contradistinction to *quantity*, that will shortly be brought within the reach of those desirous of increasing their yearly profits at other than their neighbours' expense.

That it is also still possible for the tea industry to reduce cost of production is clearly shown by the success of the new system of plucking that I am responsible for and by the attention it is attracting throughout Ceylon, where the experience of plucking goes back for over twenty-five years but is yet found capable of improvement.

HENRY M. ALLEYN.

Ceylon, 18th Aug., 1902.

—*Indian Gardening and Planting*, Aug. 23.

QUININE MONOPOLY IN JAVA.

It is stated that an agitation has arisen among the cinchona growers of Java to induce the Dutch Government to take over the quinine manufacture, and to convert it into a State monopoly. The planters are under the impression that, as Java is the principal source of production of cinchona bark, the Dutch Government by monopolising the industry would have it in their power to adjust the price of quinine in the world's markets to almost any height they thought fit. The attitude of the Dutch Ministry towards this scheme is not known, but it is significant that the Governor-General of the Dutch East Indies has empowered the officially-appointed Director of the Government Experimental Institute for cinchona cultivation to take over the management of the Bandong quinine Factory, retaining meanwhile his directorship of the Institute. Should the monopoly be carried out, the first effect would be the prohibition of all export of cinchona barks from Java. It is believed, however, the *Sud. d. Ap. Ztg.* says, that the Dutch are too cute business men to enter upon a course of action which might lead to a profitable industry slipping out of their hands through the stimulus to cinchona growing that would naturally be excited elsewhere—in Ceylon, for instance. —*British and Colonial Druggist*, Aug. 15.

PLANT TREES

What do we do when we plant the tree ?
We plant the ship which will cross the sea:
We plant the masts to carry the sails,
We plant the plank to stem the gales,
The keel and keelson, beam and knee:
We plant the ship when we plant the tree.
What do we plant when we plant the tree ?
We plant the houses for you and me,
We plant the rafters, the shingles, the floors,
We plant the studding, the laths, the doors,
The beams, the siding, all parts that be,
We plant the house when we plant the tree.
What do we plant when we plant the tree ?
A thousand things that we daily see,
We plant the spire that out-towers the crag,
We plant the staff for our country's flag,
We plant the shade, from the hot sun free,
We plant all these things when we plant the tree

HENRY ABBEY.

—*Agricultural Journal*, Natal.

YIELD OF RUBBER.

To the Editor of *India-Rubber and Gutta-Percha Trades' Journal.*

Dear Sir,—Some time ago you asked for some further particulars about two cultivated rubber trees, nineteen years old, having yielded twenty five pounds of rubber each, as per the following paragraph :—"From the *Penang Gazette* we learn that upon reliable information two cultivated rubber trees of nineteen years old have recently been tapped, and gave 25 lb of rubber each. At least ten of such trees could be grown to the acre, and the result would be 250 lb of rubber per acre in nineteen years, as against 9¼ lb in Assam in twenty-six years. Our contemporary does not state what species the trees belong to, and we rather question whether any trees have been cultivated for so long as nineteen years. Perhaps some of our readers in this locality can give us some further information." The two trees referred to are situated in Kwala Kangsar, Perak, and *Ficus Elastica.* Mr R Derry, Superintendent of Government Plantations, Perak, in his report for the year 1900, says : "The largest tree at Kwala Kangsar is about ninety feet high, and eighty-eight feet at three feet from the ground. Measuring all round the aerial roots the branches extend to 36 paces, and the largest leaves obtained 13 in. × 7 in.; its age is nineteen years." Again he says : "From the latter (referring to the two nineteen-year-old trees) 25 lb of rubber has been got from each tree and the tapping was far from being exhaustive."

Our returns here from *Ficus Elastica* are likely to be far in excess of those officially recorded by the Government Plantation in Assam, which, indeed, so far, do not offer much inducement for private enterprise in this direction.—I remain, dear Sir, yours faithfully,

FRANCIS PEARS.

Lanadron Estate, Muar, Straits Settlements, June, 27th 1902.

RUBBER TREES AND WHITE ANTS.

Replying to a correspondent of our contemporary, Mr E E Green gives some useful information:—"Your correspondent 'Rubber' does not say whether the 'white ants' are attacking the outsides or insides of his trees. There are many different species of termites (white ants) in Ceylon. Most of them confine their ravages to dead wood; but others certainly do attack living plants, though it is usually the more functionless parts of the plant that attract them. For instance, one species eats away the heartwood of tea plants; but leaves the outer-growing parts (cambium layer, &c) untouched. I should be glad to receive specimens of the termites that are damaging the rubber trees, together with exact particulars of the nature of the injury. If the point of attack is external, an application of 'Gondal Fluid' (invented by Dr. Geo. Watt) might be tried. It should be painted on the base of the stems. A band of some sticky compound might prove useful. The ants would find great difficulty in crossing this. An Indian paper (*Indian Gardening and Planting*, September 20th, 1900, p. 190) gives an account of successful experiments conducted by the Agricultural Society of India, with a compound called "Atlas Preservative A." This mixture was applied both to dead wood and living plants, with satisfactory results in every case. The termites refused to touch the plants that had been so treated. Unfortunately the paper does not give the name of the maker, or tell us where the preservative can be procured. But, if these termites are internal feeders, nothing can be done beyond the destruction of their nests when found. The difficulty is to be sure that you have found the nest of the actual species that is doing the damage. In the case of the species that hollows out the stems of tea plants in Ceylon, I have never been able to trace any definite nest."

EUCALYPTUS COCCIFERA.

With reference to Mr Divers' letter on Eucalyptus at p. 140 of your issue of March 1, I desire to say that in my opinion there is no doubt that Eucalyptus coccifera is a good species and quite distinct from E. amygdalina. The former is a shrub or small tree, chiefly found near the submit of Mount Wellington, Hobart, Tasmania; the latter is usually a fairly large tree, widely diffused in Tasmania and Australia, and known as Peppermint. E. coccifera does best in England, because it never grows naturally except in cold localities. E. resinifera is the "Forest Mahogany" of New South Wales and grows naturally in rather warm situations, i.e., at no great elevation above the sea-level. Of course, like many other species, it can be gradually acclimatised into somewhat colder places. E. ficifolia is a small Western Australian species with beautiful masses of flowers, varying from pink to scarlet. It grows well about Melbourne (Sydney is too warm for it, except in exceptional circumstances), and seed can be purchased from any good Melbourne firm. It is apt to die off at the collar if the situation be too moist.—*J. H. Maiden, Sydney.*

RUBBER CULTURE IN THE CAMEROONS.

According to private information to the *Tropenpflanzer* the rubber culture in that province makes further progress. At the Molive plantation the growth of the Kickxia trees is very favourable and also this year's plants developed well. Dr. Preuss, the director of the botanical gardens at Victoria-Cameroons, writes, even in March, that the Kickxia is the only rubber tree that may have a future in the Cameroons, for already very young trees give good rubber. On one tree, which had three fruits one month ago, there are now blossoms and fruits of all sizes. This year he has distributed 115,000 Kickxia seeds. The trees do not give much shade. One would therefore do best to plant them thickly between the cocoa trees, provided this does not damage the cocoa trees. Mr Preuss is now planting a big ground with Kickxias at various distances from one another. Regarding Castilloa Elastica, the trees which have not been attaked by caterpillars are getting on all right at the Molive plantation and Mr Eigen thinks there is little to be feared during the rains. Mr Preuss is sure that, with some attention, the greater part of these caterpillars can be removed. As a rule they do not sit in the bark itself, but just underneath the outer skin and can hardly be noticed from the outside, but can easily be found by passing the fingers along the soft parts undermined by them. The bark has then to be removed quickly and no time must be given to the larvæ to retreat into the interior of the stem. Mr Eigen tried to protect the Castilloas against the beetles by putting lime and clay on the stems, but this had no effect during the rainy season, as it was washed off by the rains. Sticky girdles are, of course, quite useless as the beetle flies into the trees. The only effective remedy during the rainy time seems to be the painting of the stems with tar. Dr. Preuss discovered the caterpillar also in the Kickxias, where it had made passages in the bark but could not enter the wood. It has now disappeared.—*Gutta-Percha Trades' Journal*, August 4.

LIFE IN THE WILDS OF BRAZIL: A RUBBER INSPECTOR'S TRIALS.

RUBBER ESTATES OF PARA v. F S CLARK.—Before Mr Justice Darling and a special jury an interesting case was heard on July 23rd, in which a vivid description of life in the wilds of Brazil was given. Mr Clark went out to Para in 1899 as an inspector in the employ of the Rubber Estates of Para, Limited. He fell ill, and in consequence his agreement was cancelled and he returned home. Subsequently proceedings were instituted to recover from him the balance of an account for goods supplied from the Company's stores. Mr Clark counter-claimed for wrongful dismissal and breach of agreement "to provide properly furnished house and accommodation" and "all necessary medical stores." His Lordship intimated that there was no wrongful dismissal and that the breach of agreement was the only matter that required investigation.

Mr Clark described his accommodation at Canhanton as a long shed, part of which was a house and part of which was a store, the whole covered with a roof of corrugated iron. The sleeping accommodation consisted of a small room in which seven or eight officials hung up their hammocks. The only alternative was to sleep on the verandah. As for furniture, there was only one or two chairs, and scarcely anything else. They had to use soap boxes instead. The food was mostly third-rate tinned stuff, and as a delicacy was added dried cod fish. In reply to his Lordship, Mr. Clark stated that there was no chance of shooting any game, a parrot being about the most that could be obtained. At another station where he was sent to the accommodation was even worse, the roof leaking badly. When they arrived at first the room was full of sick natives suffering from fever, dropsy, bad throats, and so on. They had to turn them out, and as a consequence about a half of them died. There was no doctor, and when he fell ill the only attendance he could get was a chemist's assistant who used to come up to practise on the natives. As he did not like the looks of this assistant he did not undergo treatment.

Ultimately Mr Clarke was sent to Para, where he received notice of dismissal. His health had been bad ever since. In cross-examination Mr Clarke stated that, as they could not drink the water, they had to drink beer.

On behalf of the Company it was stated that the accommodation was only temporary and as good as could be expected under the circumstances. The Company's manager at Para said that no complaints had been made, otherwise he would have done all in his power to mitigate matters. Judgment was given for the Company with costs.—*India Rubber Trades' Journal*, August 4.

EXPERIMENTS WITH LIQUID FUEL

The question of liquid fuel is receiving my general attention from planters in Ceylon. When it is mentioned that it has been estimated, by a competent authority that planters have spent for oil to date this year R60,000, and that to produce the same result with liquid fuel R30,000 only would be required, it will be seen that consideration of the subject is profitable to the planter. An up-country correspondent writes to us:—"I have just returned from Nawalapitiya where I went to see a Hornsby Ackroyd Engine, 9½ actual horse-power, tested with liquid fuel. Messrs. Brown & Co. have been driving their workshops there with a 9½ horse-power Trusty Engine, but to test the liquid fuel at the instance of Messrs. Delmege Forsyth & Co. they put a 9½ horse-power Hornsby Ackroyd Engine alongside of the other and the 9½ horse power Trusty Engine used ·80 of a gallon per hour to drive the workshop while they used only ·75 of a gallon per hour working with liquid fuel in the Hornsby. They tested the Hornsby for an hour to 9½ actual horse-power working with liquid fuel and it used ·84 of a pint per horse-power per hour. No alteration is required in the engine and it was worked as easily with liquid fuel as with bulk oil and the one or other could be turned on or off at will and the engine continued to give the same result. This is a very great matter for the planting community as it reduces the cost of power to under half of what it was before. Liquid fuel at Nawalapitiya costs 20 cents per gallon getting it in casks; Bulk oil less rebate 45 cents. If Bulk installations are arranged for the liquid fuel the cost of freight will be much reduced. The cost of liquid fuel in Colombo is 12 cents; freight and sending it in casks is 8 cents per gallon."

SOLUBLE TEA SYNDICATE, LTD.

The memorandum and articles of association of this new Company are given in the *Gazette*. The objects for which the Company is established are, among others:—

(1) To purchase or otherwise acquire in Ceylon or elsewhere any patents, *brevets d'intention*, licences, concessions, and the like conferring an exclusive or non-exclusive or limited right to use, or any secret or other information as to any invention in relation to the manufacture of soluble tea and in the processes by which the same is effected, and any improvement in such manufacture, and any advantages and benefits incident to or be derived from the same.

(2) To enter into any agreement or agreements for effecting such purchase, and in particular into an agreement with Montagu Kelway Bamber and John Roger for the purchase of their inventions and patents in connection with the manufacture of soluble tea and in the processes for effecting the same and any improvements thereon for a sum of One thousand Pounds (£1,000) sterling in cash and Sixty-one thousand Rupees in ordinary shares of this Company, and a further sum of Three thousand (£3,000) sterling and Six thousand (£6,000) sterling to be paid to them out of the profits earned by the Company during five years from the incorporation of the Company, or out of the profits to accrue to the Company from the sale of the business thereof within such period of five years, as provided in the said agreement with the said Montagu Kelway Bamber and John Roger, and subject to the conditions therein contained.

The nominal capital of the Company is R500,000 divided into 5,000 shares of R100 each with power to increase or reduce. The signatories to the memorandum and articles of association are:—Messrs John Spicer, E Ernest Green, John Roger, M Kelway Bamber, J A Henderson, W T Highton and G W Suhren each—taking a share. The first Directors are to be as follows:—Messrs John Spicer, Frank Liesching, Montagu Kelway Bamber, and Francis Theophilus Turpin.

CONTRACTS AND COCONUTS IN CEYLON.

[BY A SETTLER.]

We were partners, Jack Ohren and I, and had lost rupees and time in many wild schemes by way of making a fortune in Ceylon. Our latest venture was a coconut estate. We had secured a Government contract for the supply of wood as fuel on the railway engines running between Colombo and Nanu Oya. It was necessary to live near the railroad and in a district where this fuel should be easily procurable. We pitched upon a village close by Veyangoda, about forty miles up the line from Colombo. Plenty of jungle lay around, and the station was within a mile. We experienced some difficulty in discovering a habitation; the only one available was an old house standing in about 100 acres of coconut land. It appeared to have been untenanted for years; there were no doors, the verandah was broken down, and great vines thrust their way from floor to roof. As for the plantation, it had returned to its original state of jungle. However,

we concluded that the place would have to do. The landlord had notice of our coming; he was an old Cingalese gentleman of venerable appearance, and received us with much ceremony.

A PALAVER FOR A LEASE.

Two wooden chairs were placed for us under a banyan tree and some bottles of beer procured from somewhere brought forward for our refreshment; but as these had stood for some time in a temperature of over 100 degree the beverage was flat, warm, and undrinkable. We accepted some arrack, guaranteed to be sixty years old; it was a liquor resembling curacoa with an aftertaste of coconut. Grouped behind our host stood the greybeards from the village; all the male population of the neighbourhood squatted round in a wide half-circle; the females were not *en evidence*, but a sustained giggling in the bushes, and the occasional glimpse of a bright-coloured garment, revealed their presence.

Proceedings opened with a speech from our prospective landlord who began by asking a favour. His nephew, educated at a mission school, desired a post as clerk in the Kachcheri (Government offices). The young man was brought forward and salaamed profoundly. I promised to use my influence in this direction, and referred to the object of our visit; we wanted a lease of the land and dwelling-house for a term of years—how much? At this there was quite an outcry: the day was young, and tomorrow would bring another day. Why hurry? It surely would be an honour and blessing to the village if the Mahatmayas took the place; they could live there for ever and a day without fee or payment; but the owner was a poor man, what would we offer? It was good land, the best in the island, and the house walls were so thick that an elephant, or a drove of elephants for that matter, could not push them down—such mangoes and bananas were never grown elsewhere. These remarks were not addressed directly to us, but shouted from one to the other with much noise and gesticulation. Some individual made an assertion, and this would be taken up and repeated in chorus all round the circle. A wild-looking man, with hair tangled to his shoulders, jumped about like a marionette, relating, amid much excitement, a story about his cow. It appeared that the animal had strayed into this Garden of Eden about which we were in treaty and was lost for some days. It returned to the bosom of his family so fat that no one could recognize it. Two of this man's comrades beat their naked breasts and tore their hair, declaring that their friend spoke the truth. The cow was wellnigh bursting its hide with fatness. At this juncture I rose to a point of order and suggested that the meeting should now disperse, leaving the landowner, two of his friends, and ourselves as a Committee to determine the point at issue. This brought the crowd up with a sharp turn, the noise was hushed, and they departed.

METHODS OF COMPUTING RENTAL.

The native method of estimating rental of coconut land is somewhat primitive. Records of the estate for the past hundred years were produced written in Cingalese characters on palm leaves, and the number of nuts averaged; it was then cheerfully proposed that we should pay an annual rent equal to double that value. It was no easy task to persuade them that this demand was unreasonable; in letting the place they would be at no expense in collecting crop and so on. We offered half the rent. After another visit a few days later we got a lease on this basis, and entered into occupation.

First of all the bungalow was made habitable with a new roof and a clean cowd-ung floor; the fallen trees were useful in propping up the verandah; two camp beds, some furniture, and a few kitchen utensils bought in Colombo completed our household equipment. We then turned out attention to the plantation. All jungle growth was cut down, the land irrigated and manured, and fresh saplings planted in place of those coconut trees which had fallen. We calculated that the yield of nuts would be increased fourfold in a few years. Then agreements for supplies of wood were negotiatad with neighbouring owners of forest land; we bought some bullocks and waggons, and engaged a gang of coolies; the wood was carted each day, cut in lengths, corded, sent to the depot, and piled in the yard, ready to be put on board the railway engines. Then a bright idea occurred to me. It was ever thus. I was always brimming over with bright ideas, which when tried in the balance, were generally found wanting, so far as pecuniary advantage to ourselves was concerned. Many passenger boats called at Colombo—P. & O., British India, Orient, and Messageries Maritimes; occasionally two or three would be lying in the harbour at the same time. We would raise chickens and sell them on board. Two incubators were purchased; it was easy to keep up the required temperature during the day in the sweltering heat of Veyangoda; at night the lamps wanted a little care.

OUR POULTRY YARD.

Our bungalow had soon so large a feathered population that there was scarcely room to turn. Turkeys, geese, ducks, and chickens, we reared them all and they roosted all over the place. Having raised our fowls, the next step was to dispose of them, and this part of the business proved more difficult than I had expected. The chief stewards on board the ships willingly accepted our hospitality in the shape of tiffin, or dinner, at the Grand Oriental Hotel. Champagne is expensive; it takes off the profit on a small deal, and they were not liberal with orders. We had scarcely taken into account the ice chambers with which all these big liners are provided. My first sight of one of these was a revelation, rows and rows of ptarmigan, larks, ortolans—everything was there, to say nothing of tons of beef and mutton. On my last visit I bought two English pheasants from the steward of a P. & O. boat. I gave a good price for these, and took two men home with me to help eat them. The pheasants were delivered to the appu (head servant) with many injunctions as to careful cooking and so forth. We sat down to dinner expectant—"Shot in old England, my boy"; soup was served, then an entrée. Our cook was a dab on entrées, but it was well not to inquire too closely into their composition, and then came beef, the same tough old beef. "Appu," I said, "where are those birds I gave you this afternoon?" "Master had birds I bring in just now; master eat plenty, and say very good." It was too true: the cook had cut the pheasants into small pieces, and served them up as "salmi" of jungle-fowl. In connection with our poultry-raising experiment, an aunt of mine in Somersetshire forwarded us a

crate of English fowls, Orpingtons and Minorcas; these arrived in good condition, but after a time they one by one sickened and died; the cobras accounted for some, others succumbed to heat apoplexy. Altogether they did not take kindly to the climate. I had not the heart to write and tell the old lady about this, but some elephants' tails that Jack had in his possession came in handy. I got these mounted and framed in a case, with an inscription to the effect that it was presented to me as first prize for an exhibit in the Trincomalee Poultry Show. It occurs to some people even now, who see the case hung up in the old home, that it is a somewhat incongruous prize for a poultry show; but my relative explains that Ceylon is such a queer country.

A SERIOUS CONSPIRACY.

In the meantime the timber business was prospering; we had settled down to a pastoral life and were happy. Then the blow fell. Our men returned one day with empty waggons, and reported that the proprietor of the place where they had been working had met with a domestic misfortune; his mother and grandmother had suddenly died, and no timber could be removed on that account. On sending to three land-owners the coolies came back empty-handed with the same tale. We were liable to a penalty of a thousand rupees for breach of contract with the Government. We started off at once, provisioned for a week. If these people could not let us have wood, we must go further afield and make fresh arrangements. A Winchester repeater was taken along and revolvers. It was not contemplated to use these seriously, but the villagers in the interior bore a very bad character; a display of force might be necessary. We also carried a gun for snipe and hare. Something in the way of game must be shot each day for food. Tinned meat gets monotonous. As our procession approached the forest belonging to that orphan who had first refused to supply, there was an ominous tom-tom beating and blowing of horns. The wood lay stacked under the trees in corded bundles, and our frightened coolies proceeded to put it in the carts. This was the signal; they were instantly surrounded by a horde of naked savages, all carrying knives and screaming like demons possessed. Our appearance from under the waggon tilt, and a rifle-shot fired in the air, caused a general stampede, although they did not run far. I inquired for the landowner; he could not be seen, but the Aratchi (headman of the village) was dragged forth much against his will. It was then we learned the true inwardness of all this trouble. Our landlord's nephew, thanks to the letter I had written for him, had obtained a billet as clerk in the Kachcheri; he had ferreted out the particulars of our contract, and then communicated to these people the astounding fact that we were receiving more money for wood than we paid for it. The result had been that each native owning a strip of jungle immediately sent in a tender for the supply of fuel for the Government locomotives; they had no thought of keeping faith with us. I showed the headman my repeating rifle and partially explained its mechanism, assuring him that from a distance of twenty miles, more or less, it must hit the mark every time, and would fire a thousand shots without a reload. He was much interested, and no doubt made up his mind to steal it if an opportunity occurred. After seeing the carts loaded and despatched we set out to call upon the native chief of the district (the Adigar), with the intention of lodging a complaint as to the unruly conduct of his people, and making some agreement with him for the regular supply of wood. It was three days' journey to this gentleman's residence, and we never got there.

IRREMEDIABLE DISASTER.

On the evening of the second day we halted under some palms by a well, lighted a fire that the smoke should keep off the mosquitoes, and prepared to encamp. I noticed a man hiding behind some bushes near by, and reached for a revolver, not doubting that our friend, the Aratchi, had sent some one to annex that rifle. But it was not so. I fired a shot in his direction, when the man broke cover and came rushing frantically towards us. It was our Tamil timekeeper; he could have come up before, but had taken a short cut across country, and waited here in order to make his entrance with proper dramatic effect. The poor fellow threw himself flat on the ground, moaning piteously. He was covered with blood, and presented a most woeful appearance. Many of these sanguinary stains were artistically smeared on his body quite recently, but his tale was bad enough for anything. Disaster has indeed overtaken us. Our coolies, in attempting to remove another load of wood, had been attacked and severely beaten, two of them tied up and tortured, bamboo splinters put down their finger nails; the bullocks were also shamefully maltreated. This was not all: the mob had looted our bungalow and burned the store of wood. We held a council of war. It would be worse than useless organizing a punitive expedition to the offending village; no one would be there, while we might do some damage and get into legal difficulty. It remained only to return home as quickly as possible, and this we did, to find desolation; everything portable was stolen or destroyed, and the coolies had run away not to return for many days. The most extraordinary feature of the whole affair to an Englishman unacquainted with Eastern ways was the fact that everyone at Veyangodda professed to know nothing whatever of the outrage; they had neither seen nor heard any disturbance. This occasioned some delay, as the rioters had to be identified, and it is impossible to say if the real culprits were eventually caught or not. The native police are not particular, so long as they get someone; but about a score of men were found for the next assizes. I saw them in the dock, and a sorry-looking lot they were.—*Pall Mall Gazette*, Aug. 12.

PLANTING NOTES.

Rubber.—The attention of the Committee of the Liverpool Chamber of Commerce had been drawn to the desirability of urging the Colonial Government to instruct the natives, in a systematic way, in the best methods of preparing rubber of different kinds for European markets. It was pointed out that the market price for rubber is at present so low that it would be well to encourage the natives to attend to the production of and to prepare the best qualities of rubber only; that when the heavy porterage on the coast is taken into account it is essential to get the highest qualities of rubber, free from water, in order to be able economically to work at greater distance from the coast; and lastly that so long as there is free competition amongst the coast merchants the native may rest assured that he will get the full market value for his produce at the shipping port. It was resolved again to press the matter upon the attention of His Majesty's Government.—"Liverpool Chamber of Commerce."

The Extraction of Sarsaparilla is free to every inhabitant of the Republic of Guatemala who obeys the necessary rules. A written request for a licence, drawn up on stamped paper, must be presented to the political chief of the district, stating the locality where he proposes to work, the number of workmen employed, the length of time for which the licence is desired, &c. The person holding such licence may put up houses, huts or any necessary workshops under the condition that, on the expiration of his licence, such improvements remain the property of the Municipality or Departmental Government. One indispensable condition is that at least two roots be left on each plant, so that it may grow again, and, of course, persons holding licences for the extraction of sarsaparilla are expressly forbidden to engage in the extraction of rubber or any other substance than that named in the said licence. A minimum duty of one dollar (currency) must be paid on every one hundred pounds of sarsaparilla obtained, and the offices where the duty is to be paid are specified in the regulations. The licence is withdrawn if it is proved that the person holding it has destroyed all the roots of one or more plants, or has broken any other of the rules laid down.—*B. and C. Druggist*, August 22.

Electric Power Plants in the Pacific States of America.—In a paper recently read before the New York Electrical Society, by Dr. F. A. C. Perrine, a full account is given of the the progress made in utilising the waterfalls and rivers along the Pacific slopes of the Rocky Mountains for the development of electric energy and its transmission over long distances for use in town lighting, and for motive power in the mining and manufacturing districts of the Pacific States. Power is transmitted for distances rising from 50 to 80, to 150 and even 218 miles! After this, how long is it to be before the Colombo Electric Company utilise the great waterfalls from Maskeliya to the Kelani Valley? Here is a case in the Far West, or very nearly the Far East from Ceylon :—

"One of the most remarkable installations is that at the Snoqualmie Falls, Washington State. These Falls are situated in the Cascade Mountains, amidst most beautiful surroundings of river, gorge, and magnificent spruce forests. To provide the power-house here, the startling plan was adopted of excavating a cavern within the very rock over which the Falls plunge. This was rendered necessary owing to the spray from the Falls, which made it impracticable for any power-house to be established at their foot, and to have gone further down the river to a suitable site would have involved greater expense than the present work. To reach the cavern in which the power house is situated entrance is made by a little cabin near the fore bay to a shaft in which an elevator works, and which also contains the penstock, and 250 feet below the surface the machine-room is reached, in which are located six 1,500 kilowatt generators. This plant was one of the first in which aluminium was used for its transmission lines. The lines are carried over difficult mountains, and through continuous forests of dense spruce and fir, which have been carefully cleared along the route to prevent the trees falling and interrupting the service. Current is transmitted at 60 cycles to the cities of Seattle and Tacoma, where it is employed for lighting and for operating the railways. In Seattle the current is transformed by rotary convertors, but in Tacoma motor generators are used for this purpose and regulation obtained by a combination of synchronous and induction motors."

Japanese Camphor.—The Nippon Camphor Company (Limited), of Kobé, has been taken over by the Monopoly Bureau of the Formosan Government, and is carrying on the business as hitherto under the name of the Kobé Branch of the Monopoly Bureau of the Formosan Government, at No. 4 Fukiai, Kumoidori, Kobe Japan.—*Chemist and Druggist*, August, 30.

Oil of the Atlas Cedar.—The essential oil of the Atlas cedar, which has recently been strongly recommended as a remedy for venereal diseases equal to sandalwood oil, has been chemically examined by Boisse (*Bull. Comm. 1902, 291*). The most important point which this examination brings out is that the oil contains sixteen per cent of a sesquiterpene alcohol. As is well-known, ordinary cedarwood oil only contains about two per cent of such alcohols, whilst it is to the presence of a large amount of such bodies that sandalwood oil owes its efficiency.—*Chemist and Druggist*, August 9.

Pisciculture!—The disciples of Izaak Walton in Ceylon will, we are sure, appreciate the article we reproduce from the *Indian Field* on this subject. (See page 252.) The article is published by our contemporary in view of the interest now "taken in the East anent the importation of trout ova from Home with a view to the introduction of that game fish to Ceylon, the Doon, the Neilgherries, and Kashmir" and consists of a lengthy communication regarding the acquarium and exhibit of hatching apparatus at the International Exhibition now being held at Cork which gives a short resumè of the necessary process and period of incubation.

"Ceylon Tea Absolutely Repulsive"—Such is the courteous expression of personal opinion used in a letter to the press by Mr. Arthur Stanhope Aldrich, H.I. Japanese Majesty's Consul at Wellington (Palmerston North?), a copy of which he sends us with his compliments. It is considerate of Mr. Aldrich to do so; and in return we are not only replying to some of his statements at once; but are sending him a copy of our little pamphlet on Ceylon tea, showing the wide appreciation of its good qualities, by the best judges of tea in the world—in the United Kingdom, Russia and Australia. The people of North America are far behind as tea-drinkers and have to be educated up to the standard of the best teas. It is all very well for Mr. Aldrich to stand up for the country he represents; but his "absolutely repulsive," as applied to Ceylon tea, is too much and very unjustifiable altogether and he has to be told that Canton merchants, dealing with the finest and most delicate of China teas, have confessed the very high qualities of our teas which can be got of as delicate a flavour as any from China. Of course, there is such a thing as bad tea to be got under the name of "Ceylon," but not nearly in the same proportion as there comes from China and even Japan, where Prussian blue and other deleterious substances are used to colour the tea. Mr. Aldrich has evidently much to learn about Ceylon tea, as well as about the doings of the Chinese and Japanese in regard to much of their teas.

Correspondence.

To the Editor.

LIVE STOCK AND SINHALESE CATTLE IN TRINIDAD.

Government Farm, Trinidad, B.W.I., Aug. 13.

DEAR SIR,—May I ask you to again kindly accept the Annual Report on the working of the Trinidad Government Farm?

The Farm is placed in a new situation and greatly enlarged, and I trust that its usefulness to the Colony will be increased.—Yours truly,

C. W. MEADEN, Manager.

[We quote at once the parts referring to the Sinhalese cattle :—

THE HERD.

PURE BRED ZEBUS.—This section of the herd has been increased by the addition of seven heifers. A bnll and two cows are on their way out from India. Thus angmented, the Zebn section will be in a position superior to any in its history, in nnmber, stature and general form.

MILCH HERD has been increased to 147 breeding cows all in good profit, these will be steadily increased and with the help of the Tobago branch a sufficient number of cows will be established so as to furnish from them the animals required to snpply beef for the institntions. In three to fonr years' time we should be in a position to do this, and the cost of doing so will be covered by the annual revenne or withont additional expenditure.

CINGALESE.—There is nothing worthy of remark concerning these; two calves were born, one being deformed had to be destroyed. The general health of the herd has been good, a few acute cases of mamitis occurred amongst the cows, but yielded to iodine treatment. Six adult animals died from injury, four caused by falling into deep open drains and breaking their backs before help arrived. This will occur nntil the drains are ploughed in. Two deaths occurred from injury inflicted by other cows. Ten calves died from various causes, chiefly dysentery..

114 calves were born of the following breeds :—

Bulls.		*Heifers*	
2		4	Pure bred Zebu.
39	...	36	Half do
4	...	2	Crossbred Red Poll.
8	...	6	Crossbred Guernsey.
8	...	5	Crossbred Zebn.
2	...		Cingalese.

The bulls in the pnblic pastures are in good condition; a cross-bred Red Poll and a Guernsey are at San Fernando; others in the Queen's Park, Arima and St. Augustin are well bred Zebus. A new pastnre was opened at St. Augnstin and npwards of a hnndred cows have been entered. This is mentioned to show that if good bulls and accommodation is provided an increase of stock soon is evident. Arrangement is being made to place a pure Zebu bull at Mayaro and others in different districts if places can be provided.

The sale was not so sncccessful as in former years and in justice to the Farm should not have been held owing to the unsettled condition of the place; bnt as the sale is a fixtnre looked forward to with considerable interest both locally and in neighbouring islands, it would not have been desirable to omit it.

		Dollars.	
One heifer, Zebn	...		67
One pure Zebn Bull	..		150
Five ¾ Zebu Bulls	...	33 00	165
Five ½ Zebu Bulls	--	25 40	127

Of the animals sold the Zebu bull went to Berbice.

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The report is a very full and useful one dealing with a variety of cattle, an Agricultural Show, Butter-making, the Stud, Pigs, Poultry, Milk Analyses, List of Stock, Sale of Artifical food.—ED. *T.A.*]

SEYCHELLES GUANO.

London, E.C., Aug. 13.

DEAR SIR,—In the *Overland Observer* received this week some interesting "notes from the Seychelles" are published, and, it is stated, that the exports of guano are steadily increasing. You may have forgotten that some two years ago I called attention to this deposit of guano which, though poor in ammonia was specially rich in phosphate of lime, containing from 58 to 61 per cent of this valuable manuring constituent in a form admirably adapted for tea, coffee and sugar-cane, when mixed with crushed cake such as castor or rape in order to supply the necessary nitrogen, and assisted by the admixture of sulphate of potash for the supply of the dominant element of the mineral portion of the above crops.—Yours,

JOHN HUGHES.

PECULIAR STONE FROM WATTEGAMA.

Aug. 15.

DEAR SIR,—I have sent by this train a small parcel containing a peculiar iron-stone which on breaking showed some different growth inside. Perhaps you can get an opinion on it.—Truly yours, J. H.

[We sent it to Mr. Kelway Bamber who kindly writes:—"I am afraid I am not geologist enough to give the correct name for the piece of rock you have sent me, but it is very similar to some gneisses, and the colouring is evidently due to the weathering, combined with an irregular infiltration of water and air, which oxidises the iron compounds in the rock, with the production of the brown colour, in the immediate neighbourhood of the infiltration."—ED. *T.A.*]

RUBBER IN JOHORE.

Muar, via Singapore, Aug. 22.

DEAR SIR,—Referring to your rough approximation of the area under rubber in the Malay Peninsula, I can assure you that Johore at a very low estimate can account for one thousand acres. I can give no exact figures, as no returns are published; but I know what the few Europeans in the territory are doing, to which must be added the Malay and Chinese efforts in this direction. I must say also that these latter seem to be awakening to the fact that it is a good thing to go in for, judging from the enquiries I get for plants.—Yours faithfully,

FRANCIS PEARS.

RUBBER CULTIVATION IN THE MATALE DISTRICT.

Keppitigalla, Matale, Aug. 22.

DEAR SIR.—Having read the article under the above heading in the *Tropical Agriculturist* for August, 1902, from which it is inferred

that Para Rubber is unsuitable for this district, and that Castilloa is preferable—which deductions are mainly based upon *experiments* made with a few trees, and most probably growing in a favoured locality, viz., near a river—

1. do not think such figures can be used as an estimate over a large area; not that I for one moment doubt them, but as they are acknowledged experiments, they cannot have the same weight as the actual results gained over a large number of trees.

2. Prices quoted for samples cannot be depended upon, especially when the brokers know there is no bulk behind them. A sample of Para Rubber sent from this estate, when I first started tapping, was valued at 4s. 1½d. per lb.; but when the first *lot* was despatched, which was every bit as good as sample, it sold for 3s. 6d. This proves that a price quoted for a sample is not given when the article is sent in bulk, especially for a new product.

Therefore I now give you a few figures of the actual results of tapping, for the first five months of this year, January to May, 1902, and trust the figures will be of interest to all concerned, as I believe they are the first published from any estate in Ceylon; and as Para Rubber is still in the experimental stage these figures would provide some data to work upon.

I have had the actual results from one or two of the Kalutara estates given me; but I must admit that I cannot hope, at any rate at present, to compete with them, in either the quantity per tree of dry rubber or the low rate per lb. of gathering the latex; or it appears the trees in Kalutara are capable of yielding nearly twice the quantity of rubber obtained here. But in prices Matale can quite hold its own. At the last sales in London four boxes of Keppitigalla rubber was sold at 3s. 6⅝d per lb. against about seven cases of Kalutara at 3s. 6d.

Much higher prices than these have been gained by the latter mark at previous sales. The trees growing on this estate are about 8 miles from Matale town, as the crow flies, at an elevation of about 600 feet to 1,400 feet, ages of trees from 8 to 11 years; the largest girth one foot above the ground is 47 inches. Temperature in shade 77 to 92 degrees highest recorded in April. Average rainfall 70 to 80 inches. The trees are not inclined to spread, and grow straight up, with few side branches, and make an excellent light shade for cacao planted 12 feet apart in line, and 24 feet from line to line, thus giving about 150 trees to an acre. Tapping proceeds throughout the year, and each tree has two series of tappings lasting about two months.

Now we come to results:—Number of trees tapped once 3,903:—Since October 1901, and dry rubber from first tapping 2,128 lb. or just over half lb. per tree. Some of these trees were tapped again in June-July, and gave equal results, thus making 1 lb. rubber per tree per year. By the above figures, it will not be too much to estimate three-quarter lb dry rubber per tree all round, having 150 trees to the acre. The best results are not always gained from the largest trees, as many of the smaller trees yield twice as much.

An experienced person can tell fairly well by the appearance of the bark whether a tree will yield well or not. A tree with a greyish, and hard-looking outer bark very seldom yields well, while on the other hand a softish-looking bark, almost flesh-coloured, is sure to give a good yield.

The proportion of scrap rubber to best quality is very small indeed, about 4 per cent only.

Number of pounds dry rubber gathered from January to May, 1902, 1,362 lb.

Best quality	1,302 lb.
Scrap rubber	60 lb.
Total	1,362 lb.

Cost of tapping and curing 1 362 lb dry rubber	R570 63
Transport, rail fare, boxes, &c.	R 31 13
Cost for the year: 1,600 collecting tins ...	R 48 00
Cost for the year: 1 doz. tapping knives ...	R 30 30
48 coagulating tins ...	R 9 60
Total cost accessories for 12 months ...	R 87 90
Jan. to May 5 months 'share of accessories	R 36 60
Total cost in Colombo for 1,362 lb. rubber	R638 36

or cents 46·86. per lb.

Most of the rubber was sold at 3s 6d per lb., and the scrap rubber at 2s.

From the above facts it remains for your readers to judge whether Para Rubber is suited to the Matale district or not.—I am, sir, yours faithfully,

FRANCIS J. HOLLOWAY.

Samples of rubber sent.

[Which can be seen by any one interested, at the *Observer* Office.—Ed. *T.A.*]

TROUT FISHING IN CEYLON.

Aug. 26.

Dear Sir,—This sport has so far been more or less in its infaucy, though I have had many a pleasant day's fishing during the past few years; but there's a real good time coming in the near future and I hope all interested in this most healthful, pleasurable pastime will now join the Club and so help to make things hum generally. I had occasion to be in Nuwara Eliya yesterday and, of course, made it convenient to have a couple of hours' fishing from 2 to 4 p.m. During that time I landed 28 fish. One a brown of just under 1 lb., I kept and the other 27, all locally-bred rainbows and real little beauties, ranging from 3 to 8 or 9 inches, I safely transferred from the Nuwara Eliya stream to the Nanuoya at Blackpool.

Had it not been that the capacity of the carrier had to be considered I have no doubt I could have transferred 100 at least before dusk for the stream simply swarms with young trout and I fished only a few hundred yards of by no means the best of it.

I have had better sport than this in Old Scotland, but I've often had much worse; and, though I did not succeed in landing two trout at one cast, with a couple of flies on, I had frequent double rises and might have done it had I used more suitable flies for such work.

I think the Club should present a few of those little fishes to all members of the Club within a reasonable distance of Nuwara Eliya, provided they have suitable ponds or streams which they will endeavour to protect from the rapacious curry-pot of our friend, Ramasamy.

This would help to start the general distribution of these fish, which is much to be desired, I think.—Yours faithfully,

JOHN FRASER.

PAPAIN OR PEPSINE.

August 1902.

DEAR SIR,—In your *T. A.* number of 1st Oct., 1898, page 236, I found an article about Papain. It is said:—"Out of many fruits you will only be able to obtain but a few ounces, whereas from the trunk of the tree and other parts of the plant you can obtain several pounds." I am intending to make a trial with Papain producing, but not knowing how to obtain it from the trunk I should be very thankful to anyone with experience for information.—Yours truly,

A DELI (SUMATRA) PLANTER.

[Who has had experience of Papain extracting or collecting in Ceylon? We should advise our Deli friend to make experiments on his own account and judge by the result and the report of his European Agents.—ED. *T.A.*]

THE SUPPLY OF COCONUTS FOR LOCAL WANTS AND EXPORT.

August 26.

SIR,—In reply to "Cocos Nucifera" in your issue of August 22nd, I would be inclined to say that local consumption of coconut products has increased prodigiously within the past 20 years, perhaps even to an extent beyond the supply made by extended cultivation. When I first came to Ceylon the use of coconuts was confined to householders in town and well-to-do owners of country gardens. But now-a-days coconuts for sale are a feature in every village bazaar throughout the hill as well as low country, and poor indeed is the Sinhalese who does not make use of the ubiquitous palm nut. However high the price offered by export dealers, native families, I believe, will not now forego their usual share of coconuts, so that in reality the supply for foreign trade comes from the large plantations rather than the small gardens.—Yours, etc.,

TRADER.

[Our calculation used to be 350 to 400 million coconuts to supply the export trade and as many more for local food purposes. For the latter estimate, say, we have, 700,000 households using on an average 1 to 2 nuts daily—and take 1½ nut a day which will be 383 million nuts a year. In this way we may make up an estimate of 800 million nuts as a year's crop in Ceylon; but one estimate went as high for a good season as a thousand million of nuts.—ED. *T.A.*]

WATER BOTTLES AND FIRE—TESTED.

Aug. 27.

DEAR SIR,—I noticed in your issue of the 23rd instant a statement by a "Mr. Percy Burd of Cheltenham" on "Watter Bottles and Fires" which struck me at the time as rather tall and I thought it would be rather interesting to test its probability.

In the first instance it is a matter of some considerable difficulty to get a candle alight with a lens even in this country. The wax melts freely and the wick gets charred and glowing, but the candle does not burst into flame, at least in my experience.

Secondly, I have never seen carriage lamps fitted with burning glasses. They are generally made with plane glasses, the light being concentrated by means of silvered reflectors at the back and sides, which would make the feat still more difficult.

Thirdly, it is not difficult to compute from the data what the elevation of the sun was at the time and place mentioned. It is easy to see that the altitude of the sun must have been equal to the gradient of the road, for the sun's heat to have produced its maximum effect. The following table gives the elevation of the sun above the horizon at Canterbury at the beginning, middle and end of October, between 2·30 p.m. and 3-30 p.m., and the corresponding gradient

	At beginning of October.		At middle.		At end of October.	
	Elevation.	Gradient.	Elevation.	Gradient.	Elevation.	Gradient.
At 2·30 p.m.	27°	1 in 2	22°	1 in 2½	17°	in 3¼
3· 0 p.m.	24°	1 in 2¼	18°	1 in 3	13°	in 4⅓
3·30 p.m.	20°	1 in 2¾	15°	1 in 3¾	10°	in 5⅔

So that, even if the two first objections were waived, the writer was apparently travelling along a road about two and a half times as steep as the steepest carriage track allowed in England (1 in 15). If his carriage candles did get alight, it is improbable that the sun's heat was the cause.—Truly yours,

F. R. H. S.

USEFUL TREES FOR THE HILL COUNTRY.

Abbotsford, Aug. 29.

DEAR SIR,—If the tree on Glasgow Estate is *Acrocarpus fraxinifolius* it isn't in it with *Acrocarpus grandis*. I have both of these here and the latter is far and away the finer tree of the two; but trees vary so in different situations and conditions that one oughtn't to dogmatise. The seed of the

former I got from William Brothers about 11 years ago and the seed of the latter came from Java at about the same time.

The *A. Grandis* will, I think, be a magnificent tree ultimately, but at 5,000 and 6,000 feet, trees do not grow as quickly as most of us would like them to.

The *Gmelina Arborea* mentioned in *Indian Gardening and Planting* of 14th August sounds very promising for our higher elevations, but what about our local varieties, *G. Rheedii* and *Asiatica?* Are they large trees and at what elevation do they grow? Where can one get seed of this *G. Arborea* and Northern Indian tree seeds generally nowadays?

Mr. Gammie used to be most obliging in the olden times; but he, I hope and believe, is now enjoying his *otium cum dig* on the retired list, so please advise as to where one should apply.—Yours faithfully,

JOHN FRASER.

[Our correspondent must try the "Himalaya Seed Stores" whose full-page advertisement he will find in our *Tropical Agriculturist.* As to the trees referred to, here is what Trimen says of "Gmelina's":—

G. arborea, (Et-demata, Sinhalese) (*G Rheeder.*)

A large spreading tree, bark a greyish-yellow, rather rough, thick, branchlets and young parts covered with a very fine, white mealy pubescence.

Moist region up to 5000 feet; rather common, but often cultivated. Fl. March, 4 upper lobes dull orange-pink, lower one lemon-yellow. Also in India, Burma, Malaya, and Philippine Islands. The Flower suggest a Bignoniaceous plant. They appear along with the young foliage, the tree being deciduous. Wood yellowish-white even-grained, light, strong, tough, and durable; an excellent timber. The bark and the fruit are employed as medicine in bilious fevers.

(G asiatica.) (Demata, Sinhalese, Kumil; Tamil). A much-branched bush, bark yellowish-white, smooth, branchlets horizontal, rigid, often compressed puberulous, frequently much shortened and spinous at the end.

Open places in low country up to 2000 feet; common. Fl. September; bright sulphur-yellow Also in South India. The bark and roots are used in medicine. The fruits are eaten.

Dr. Watt chiefly dwells on their medicinal uses; save that in respect of the wood of "Arborea" he writes:—

STRUCTURE OF THE WOOD —Yellowish, greyish or reddish-white, with a glossy lustre, close and even-grained, soft, strong, does not warp or crack in seasoning, weight from 28 to 35 lb per cubic foot, breaking weight of a bar, 6 feet × 2 inch × 2 inch, 580 lb (according to Baker). It is light, has a good surface, is very durable, is easily worked, and takes paint and varnish readily, and is, therefore, highly esteemed for planking, furniture, carriages, boat-decks, panelling and ornamental work of all kinds (*Gamble*). Mason states that it is largely employed by the Karens for canoes, and by the Burmans for clogs. Owing to its extreme durability, it has been recommended as an excellent timber for making tea boxes, and has also attracted much attention as a very suitable wood for furniture, picture-frames, and similar work in which shrinking and warping have to be avoided. Buchanan states in his Statistics of Dinajpur that "it is much employed by the natives for making their instruments of music." The excellence of this timber for many purposes appears to have been first noticed and described by Roxburgh, who subjected it to various experiments which he describes as follows: "One of the experiments, and the most interesting, was made by placing part of an outside plank in the river, a little above low water mark, exactly where the worm is thought to exert its greatest powers. After remaining three years in this situation, though examined from time to time, the piece was cut, with the view of carrying a specimen of it to England, and to my great joy, I found it as sound and in every way as perfect throughout, as it was when first put into the river. Amongst other things, a valuable flood door was made of it, to keep the tides out of the Botanic Garden. It is now seven years and a half since the door (which is 4 feet square) was made, and though much exposed to the sun and water, yet it remains good; while similar doors, though much smaller, made of teak, were so much decayed a year ago, as to render it necessary to replace them." Since the date of the publication of the above experiments, the wood has come permanently into notice and is in considerable demand in Calcutta for furniture-making.

As for "Acrocarpus grandis," we find no mention whatever of "grandis" by Dr. Watt, or any other authority at our command. In fact Watt says the genus "Acrocarpus" contains but the one species "fraxinifolius."—ED. *T.A.*]

WATER-BOTTLES AND FIRE.

Stubton, Rakwana, Aug. 30.

DEAR SIR,—I have read several letters in your correspondence columns on the subject of "water bottles and fire." You may be interested to hear our experience. At 8-30 one morning, when standing on our back verandah, we noticed smoke rising from a table on which were placed three caraffes or bedroom table bottles, which had been cleaned and were to be refilled and placed in each room. We concluded from the distance that the smoke was steam only, rising from the damp table; but when we approached we found the smoke arose from one spot only and the table was quite dry. The heat from this spot was so great that it burnt our fingers. The table was charred. We then realized it was the effect of the sun's rays passing through the bottle; but as there were three and the sun fell full on each, we marvelled at the others remaining untouched; so, we changed their position. To our surprise no smoke or heat emanated from the other two, although removed to the same spot as the smoke originated from: but in a few seconds the wood was burning hot and smoke ascended from the first bottle although placed at the extreme end of the table on the other side. The bottles were all in shape globular; but the glass thicker of the one that attracted the sun and flatter at the base. Why were not the others, when placed in the same position, worked upon in the same way by the sun's rays? We can quite understand that the sun's rays passing through a bottle standing in a window-sill could set light to curtains.—Yours truly,

M. BARTRUM.

P.S.—The bottles were empty.

[We referred this interesting experience to our scientific correspondent, "F. R

A. S., "who writes :—"I have read your correspondent's letter. There can be but one explanation of the facts. The bottles were all empty and only one burnt the table. The inference is that this particular one had sides thicker in the middle than at the neck or bottom, thus forming a meniscus lens, or burning glass, which would collect the parallel rays of the sun to a focus on the table. The large majority of caraffes are like the two others your correspondent mentions, with sides of equal thickness throughout : these would have no more effect upon the sun's rays than an ordinary pane of glass. It is curious to note that there would probably have been no burning of the table an hour or so later, as the rays would not then be concentrated enough for the heating effect to have been apparent. This can easily be tried if the bottle is still in existence."—Ed. *T.A.*]

THE USES OF "GLORIOSA SUPERBA AND POISONING THEREBY—AND ANTIDOTES.

Indian Museum, 1, Sudder Street,

Calcutta, Sept. 1.

Dear Mr. Editor,—I acknowledge with many thanks the receipt of copy of your paper for 20th August, 1902, containing notice of death of poisoning through eating a *Gloriosa superba* tuber.

I agree with you that the subject deserves further inquiry. Under the title of poisonous plants of Bombay (Journ. Bombay Natural History Society, VII. No. 4, 1893, p. 489) Major K. R. Kirtikar gives an interesting account of the plant which is illustrated by a coloured plate. He states that very few cases of poisoning are on record. The plant is known all over the country as a virulent poison ; it is also said to be useful in fevers as an antiperiodic.

In a paper on "Poison Lore of the Hindus," read before the Indian Medical Congress, December 1894, by Dr. N. Subramanya Aiyar (Indian Medical Gazette XXXI, 1896, p. 5) we are told that *ginger decoction* is an antidote for "Gloriosa" poisoning. This writer also adds that the root divested of deleterious constituents is reported to be a great remedy for ascites.—I am, yours sincerely,

J. HENRY BURKITT.

BRITISH NORTH BORNEO :

Audi alteram partem.

Sir,—Your contemporary seems determined to hang British North Borneo. I do not know what actuates this desire, but certain it is he does not seem to mind whose opinions he takes. One day he publishes an account which the next day he has to correct. I look to see Mr Graydon's revised before long.

The Consular Reports show that by a Census taken in 1891 the population of Labuan was 5,853 and of Sandakan 6,350 (including respectively 25 and 127 Europeans).

The shipping (including native, with the neighbouring islands, Sulu, Palawan, &c.) of Sandakan is returned as follows :—

1886	.. 115 ships	.. 29,213 tons	Entries
1890	.. 198 do	.. 64,210 do	
1898	.. 651 do	... 93,181 do	

The trade of British North Borneo amounted in thousands to :—

	Imports $		Exports $
1885	648	..	401
1890	2,018	..	901
1898	2,419	..	2,881
*1900	3,178	..	3,336

(* According to Whitaker.)

To show the principal trades embodied in the above figures, the following statistics, showing a steady advance of prosperity—are entertaining :—

Value in	1886. $	1890. $	1898. $
Tobacco	1,618	396,314	1,358,666
Timber	27,626	44,584	214,343
Guttapercha	34,747	54,448	125,280
Sago	53,417	36,950	118,602
Rattans	67,100	64,961	80,315
India Rubber	8,535	21,581	79,600
Provisions	—	—	77,724
Birds' Nests	27,953	44,864	47,160
Camphor	8,711	14,193	37,047
Coffee	—	—	28,620
Salt Fish	—	—	26,777
Trepang	—	—	26,053
Damar	11,365	5,287	25,590
Hemp	—	—	24,590
Seed Pearls	—	—	23,795
Rice	7,933	6,321	14,248

I mention rice as it is an industry in which Ceylon is interested and one likely to be developed. The infinitesimal Fruit Trade referred to by Mr Fyers amounted to $5,412 in 1898.

The average rainfall might be put down at 100 inches for the whole country. Chena cultivation was generally in vogue.

I take the following extracts from the Consular Report of 1899 :—"As regards openings in N. B. there is ample room for encouragement. . . Payable minerals will doubtless advance the prosperity of the country, but I look upon agricultural products as the backbone of B. N. B. . . The Government offer a limited number of free grants of land of 500 acres to young men with a capital of £2,000 or upwards for the cultivation of tea, coffee, &c. . . The mineral resources of the country cannot be said to have been fully investigated and much remains to be done in this direction. . . The climate is not unhealthy, but, of course, varies in different districts of this large country. . . Compared with other countries (I do not mean Singapore or Hongkong, which are collecting centres of trade) the tariff, as regards imports is very low indeed." From the same report I gather the highest rate of duty was 10 per cent—generally imposed. On a good many articles, (cloth, leather, metals, &c) 5 per cent. Building materials, food-stuffs, metals, &c. were on the free list. . . There was considerable trade with the neighbouring islands, but great room for development with a settled Government (over them *sic*). There were three engineering shops in Sandakan and about 200 Europeans in the whole territory. Readers are referred to the Straits and Singapore Directory for further information. The concluding words of the first part of the report are, "In my opinion North Borneo has a promising future." Up to the

date my information takes me, there are only signs of a steadily increasing prosperity, there is nothing to suggest a retrograde movement. I am anxious to know what has happened since then. Messrs. Fyers and Graydon agree about the railway "going nowhere in particular." They seem to have lost sight of its object, if they ever knew it, like a good many non-observant men have done. Consul Arthur Keyser in his 1899 Report, after saying that the development of the country as yet is only in its infancy, goes on to say "at Beaufort" (where the railway runs) "and for many miles round, the country is unpopulated and the land is without cultivation. Beyond the present cutting of the Railway lie vast ranges as far as the eye can reach. On the *further* side of these hills is the country which it is proposed to open up. . . . This *splendid stretch* of country is *full of possibilities* of development, and the railway is apparently being constructed in order to afford capitalists opportunity to investigate them. There is no road, only a jungle path." He points out that the cost is likely to be considerable and the engineering difficulties great.

In conclusion, I may say, I have no connection whatsoever with British North Borneo, nor with any-one connected with it and that I have not even the pleasure of knowing Mr W D Gibbon. I merely place the knowledge I have gathered together at your disposal for the benefit of your readers, lest they should be led away by your contemporary's remarks without a careful investigation of the case. As I am only quoting, what I have said will lose none of its value if I do not sign my name.--I am, Sir, yours faithfully,

A.

[Consular Reports should certainly be reliable; for British Consuls are not only men of honour, but strictly responsible for what they report. Here is what the "Statesman's Year Book" for 1902 states :--

"About 1,000,000 acres have been alienated by the Government on leases of 999 years for tobacco planting, pepper, coffee, and jungle products. There are 12 estates planting tobacco, 43 coffee and coconuts, 3 Manilla hemp, 3 pepper and gambier.

	1898. Dollars.	1899. Dollars.	1900. Dollars.
Revenue proper ...	505,369	546,129	588,026
Expenditure ...	633,051	568,347	1,386,055
Exports ...	2,881,851	3,439,560	3,336,621
Imports ...	2,419,087	2,456,998	3,178,929

The revenue includes sums realised by land sales and the expenditure includes payments on account of railways, telegraphs, and other public works, amounting for the year 1900 to 983,186 dollars.

Most of the trade is carried on through Singapore with Great Britain and the colonies. The chief products are timber, sago, rice, gums, coffee, pepper, gambier, gutta-percha, tapioca, sweet potatoes, and tobacco which is being planted on a large scale. Coal and gold have been found. The exports comprise mostly jungle and sea produce, wax, birds'-nests (edible), coco-nuts, gutta-percha, sago, tobacco, rattans, india-rubber, seed pearls, beche-de-mer, &c. A flourishing timber trade is stated to have been opened with China. Exports of leaf tobacco in 1900, 8,625 bales, valued at 92,000*l*. Shipping entered 1900, 110,908 tons; cleared, 111,385 tons; nearly all British. Borneo is now connected by cable with the outer world by a branch of the cable between Labuan and Singapore. A telegraph line has been constructed from Menumbok, where the cable reaches land, to Sandakan, where there is also a telephone exchange. A railway is in course of construction from Brunei Bay into the interior, and from there to Jesselton in Gaza Bay. It is expected that the whole length of 110 miles will be open for traffic before the middle of the year 1902."
—Ed. *T.A.*]

FIRST SNIPE OF THE SEASON.

Kurunegala, Sept. 7.

Dear Editor,—May I, again this year, claim the honour of having shot the first snipe of the season? I got one this morning at 7-30.—Yours, etc,

A. W. WARBURTON-GRAY.

[This is very early; has a snipe ever been shot in Ceylon before the end of August?—Ed. *T.A.*]

THE PRODUCTION OF THE COCONUT PALM.

Sept. 8.

Dear Sir,—I was much interested in "Traders' letter on the above subject. I agree with him that the local consumption of coconuts has grown enormously during the last quarter of a century; but I doubt if that alone explains the inelasticity of the exports of the products of the coconut palm. There never has been a year since the British occupation in which hundreds, and even thousands, of coconut plants have not been put down by villagers and small proprietors; and during the last 30 to 40 years the acreage under coconuts must have quite doubled. I am afraid the deficiency in fruit is due to backwardness in cultivation. Only the trees immediately round the villager's hut bear heavily: his garden is neglected. Even headmen, and proprietors of tens and hundreds of acres, do little in the way of cultivation. The trees look after themselves; they are unmanured; and their crops decrease or stand stationary. It is the exception, and not the rule, to plough coconut land, to weed round the trees, to manure them at regular intervals. Hence, I believe, the disappointing outturn, as exhibited in the export tables you publish.

COCOS NUCIFERA.

[Again, in many cases of small native gardens, the planting is so close, that if half the palms were cut down, the crops would be larger.—Ed. *T.A.*]

PLANTING POTS.

Sept. 12.

Dear Sir,—I have just seen "Planter's" query *re* planting pots. They are on the same principle as a flower pot, only narrower and have no bottom. These are laid down like planting baskets in nurseries for coffee, filled with earth and seeds put in. At planting they are carried to the field, earth and plant emptied out and placed in the hole, while the plot was taken away and kept for future use.

They are expensive to make and cost a great deal in transport and I should strongly advise "Planter" to use baskets as cheaper and more satisfactory generally.—Yours faithfully,

B. H. J.

THE JUNGLE CROW.

Abbotsford, Sept. 15th.

SIR,—I was very pleased and proud when some five or six years ago a couple of jungle crows settled down here as they are really handsome birds when on the wing.

They now swarm all over Upper Dimbula ; but as I feel quite certain they have either killed or frightened away large numbers of our small insectivorous birds, I have shot some six or eight of them during the past few months ; and I hope all who can hold a gun straight will join in exterminating the thieves and so help to safeguard our little, feathered friends. One crow actually attempted to enter a pigeon-cot in my kitchen verandah the other day, so like all crows they have cheek for anything.—Yours faithfully, J. F.

P.S.—Here is what " The Indian Field " of 4th inst. says of them under "The Game Destroyers of India":—

CROWS.—An arrant egg thief and chick destroyer is *The Jungle crow.* Found throughout India and ascending to considerable elevations in the Himalayas capable of enduring heat and cold, it is one of the ever-present sources of game bird destruction. In portions of the hilly tracts it is so numerous that it is a wonder the black partridge, chukor, etc.; ever succeed in hatching out their eggs. *The carrion crow* also is answerable for the absence of many a young brood of chukor, but is not found in any numbers except in Kashmir and the neighbouring hills. The delinquencies of the jungle crow (*Corvus macrorhynchus*) were brought to our notice not many years ago in a forcible manner. We were in camp at about 6,000 feet in some hills which were evidently popular breeding grounds for chukor. A prolonged halt enabled us to look for nests. One we discovered in a corn field contained 16 eggs of the chukor, whilst on the edge of the scrub jungle were other chukors' nests with varying numbers of eggs, none of these were at all carefully concealed; in nearly every instance the jungle crows found them out. Near the camp were three or four large clumps of high trees and there the crows were breeding. Most of the young crows were hatched out, for the jungle crow breeds about April in the hills, and often somewhat earlier in the plains. We saw the parent birds flying with egg shells in their bills and on walking round found as we have said most of the chukors' nests were rifled. We wiped out that colony of crows, and thus did a good turn to the chukor as a small return for the harm we have so often done them.

PLANTING NOTES.

CEYLON TEA IN WESTERN AMERICA.—From Mitcham, Surrey, under date 18th July, Mr. Fairhurst sends us a copy of an advertisement of Ceylon Tea, cut from The Santa Cruz (California) " Surf "—which he says will shew " that the exploitation of the tea is not *quite* so unknown [in America?] as a letter in your paper lately would make it appear." The advertisement is certainly striking (2½ inches by 4) half of it showing a doughty warrior on horseback, the " Pride of Ceylon.' While below it we read " Finest Hill-Grown Tea—Registered Trade Mark." The rest of the letterpress is :—

Try "Pride of Ceylon" Tea, packed in Ceylon. One teaspoonful will make one quart—5 to 8 cups. Blue Wrapper, 50c per lb. ; Red Wrapper, 75c per lb. ; White Wrapper, $1.00 per lb. ; F. A. Peterson and Co., Direct Importers. 136 Pacific Ave., Santa Cruz. Also sold by:—Hinkle's Cash Store, 2 Pacific Ave; F. D. McPherson, 180, Pacific Ave; W. A. Husband, Seabright. Sold only in the original hermetically sealed packets.

COTTON SEED OIL.— In a circular which has just been issued to the shareholders of the Cottonseed Company (Limited), the directors state that a mill of commercial capacity has been erected on the company's riverside premises in London, and that in a trial run all that is claimed for the company's process in the treatment of cottonseed was fully established. A larger building is now being adapted to receive another mill of greater capacity, which, together with further mills of varying sizes, is now well under construction.—*Chemist and Druggist*, August 30.

THE ORANGE.—The Orange is of comparatively modern introduction in horticulture. It is not mentioned in the Scriptures, nor by Herodotus, who lived five centuries before Christ. and who wrote a list of fruits then known, nor by Virgil, who wrote much about such matters one hundred years before the Christian era. The Orange came originally from the south of China, Burmah and India. It is found growing wild in the jungles in various parts of India. The Arabs introduced the Orange to their country, and thence it got to Syria and Southern Europe. This was probably the Bitter Orange. The sweet variety was brought to Europe about the fourteenth century by merchants of Genoa or Portugal. Thence the tree was passed by the Spaniards and Portuguese to the Azores and other parts of the " New World," and found congenial conditions. Mexico, Florida, California, proved to be highly suitable. The St. Michael Orange originated in the Azores ; the Pernambuco and Bahia (or Navel), were both named after provinces in Brazil. The Orange is now found growing in nearly every country where there is enough sunlight and absence of severe frosts.—*Journal of Horticulture and Cottage Gardener*, August 14.

CEYLON " GUANO."—We recall a very interesting account by a sportsman in the " Days of Old " of a visit to certain " caves " in the backwoods of the Kalutara district whence the Sinhalese paddy cultivators were in the habit of excavating guano—the droppings of birds and especially bats—and conveying the same for use in their paddy fields, having fully realised the value of such manure. We mentioned this fact to Mr. Kelway Bamber who expressed a wish to see a sample. We hope still to get one of the Kalutara article ; but the first to reach us were two samples from a Hanwella resident of guano used by the cultivators in that neighbourhood. These are not " the real Simon Pure ", being mixed with earth and poor in quality as Mr. Kelway Bamber kindly reports :—

"I tested those two samples of guano you kindly sent me some time ago, but they turned out of little value as they contained extraneous matter including earth, small stones, &c., especially No. 2. The following was their composition :—

	No. 1. Dark coloured.	No. 2. Light coloured.
Nitrogen... ...	2·80 per cent	1·12 per cent
Phosphoric Acid	1·76 ,,	trace
Potash	·19 ,,	·19 per cent

The first might be of value for application to local gardens, but would not stand freight charges."

The Future of Green Teas.—From a letter of Mr. Drummond Deane under date, Sept. 12th, we quote an opinion which may be of interest to green-tea makers, though each will no doubt judge for himself on the question raised:—

"I believe that for a time the coloured pure teas made by Ambawatte and Baraoora, may through a closer resemblance in *appearance* to the colourd 'Chinese' teas, help to open the doors of the American market, which is desirable; but I cannot lose sight of the fact that to the ordinary consumer the 'pure pan-coloured,' and the impure 'Japanese' or 'Chinese coloured' teas will in appearance resemble each other, which to my idea is not desirable. While as to the statement of Mr. Hart and, I believe, Mr. Galt, that only these 'pan fired' teas will keep and give full flavour, we have the report above mentioned on page 16, and also Mr. Hayter's letter from Toronto in reply to Mr. Hart which both go to prove that the panning process subsequent to steaming, is not necessary for *flavour* or for 'keeping qualities' of green teas. And I very much doubt if there is more profit in a coloured tea coloured by machinery panning and selling at say 7½ annas than in ordinary green teas selling at 5½ to 6½ annas in Calcutta or Colombo."

Green Teas for America.—The Editor of the *Indian Planters' Gazette* has the following satisfactory note on Mr. Judge's letter:—

"We are much obliged to Mr Judge for his letter, although he has been labouring under a misapprehension. Mr Hart's contention is that greens which have not undergone the final (long and expensive) process of panning,—which puts a hard greenish greyish appearance on them naturally (without the aid of deleterious foreign substances such as the Chinese use)—are not "true" or finished greens. The assertion is one of purely personal opinion on which parties can well afford to differ, for it is of no material consequence at the moment. After reading Mr Judge's letter, we are inclined to think that, in this matter, there will be found to exist a satisfactory demand and a good market for both unfinished and finished greens. In our notes, in our last issue, to which Mr Judge refers, we assumed that Mr Hart's dictum was in the main correct, for the simple reason that the United States, on the whole, prefer coloured greens, and the American market is the one we specially desire to capture, as it will eventually take the bulk of the green teas which British-growers will manufacture.

It was on this score that we wrote:—"What is wanted (*i.e.*, of course according to the gospel preached by Mr Hart,) is that the manufactured green teas shall in their finished state wear a greenish hue, *without being coloured by foreign substances*. This can only be obtained (by which we mean of course, on a *commercial* scale) by using the latest Deane-Judge machine, which the Baraoora Tea Company have alone got in use at present, and (we were careful to add) a certain amount of panning." We should perhaps, have italicised the last five words, for we never for a moment intended it to be understood that the Deane-Judge machine *itself* put the hard greenish greyish appearance on the dry tea, being fully aware that the process of repeated panning could alone effect this. Mr Judge clearly defines the work done by the latest improved Deane-Judge machines and the Drummond Deane System of green tea manufacture.

Green Teas—and Green Teas.—Ther is a current belief that low-country leaf makes as good green tea as high-grown. This is true, we believe, as regards "raw" or unfinished greens; but it is not so in the teas made according to the process used at Ambewatte. In teas so prepared, the superiority of highgrown leaf is readily realised. It remains to be seen how far the latest processes shortly to come into use, will succeed in turning out as good greens from low-grown as from high-grown tea.

Para Rubber at the Straits.—From an extract given on page 257 it will be seen that a Para rubber tree at Penang, about 17 years, old, has been tapped six times between the 11th and 15th year without suffering any harm giving 2½ lb. rubber each time on an average. Its size now (probable maximum) is 68 inches circumference main stem at 3 feet up. Probably 100 such trees per acre would do well, and if a price of 3s per lb. could be counted on, a return of £37 10s at each tapping, per acre, would be very good. The *India Rubber World* which has been decrying Straits rubber is said to be published in American interests. Can this be true? We doubt it.

An Effective Bird-Scare.—At this place it has been our study to preserve all birds by encouraging nest-building in every way possible, and in this blackbirds and thrushes have not been slow in taking advantage of the privilege afforded them. All this was very well so long as the birds fed themselves and their young upon worms and such-like; but when the Strawberry season came on, and the weather became hot and dry, and fewer worms were about, they turned their attention to the Strawberry-beds; nor in this were they in the least shy, for, until we endeavoured to let them know that Strawberries were to them forbidden fruit, they naturally appeared to have an idea that the garden and its fruit were all their own. The usual guys, &c., were set up, the scaring effect of which lasted only for the usual day or two, if indeed even for so long. Having in the house a couple of very talkative parrots, some of our people suggested trying the effect of placing these birds out upon the Strawberry-beds. One of them, a grey bird from the West Coast of Africa, talks fluently and his words are well pronounced; some of his speeches run thus: "Three cheers for the King; hip, hip, hip, hurrah! that is my loyalty;" "Elizabeth's got the blues; nothing new in that;" these and similar speeches alternative with splendidly whistled tunes, such as "Rory o' More," "Pop goes the weasel," The Campbells are coming," and similar other little ditties, with great force, finishing up always at the end of each speech or tune with a well-pronounced "What do you think of that?" putting great emphasis on the word "that." No. 2, a green bird from Cuba, has not such a full vocabulary as the African, but in its Spanish vernacular it made some queer noises; so that between the two blackbirds and thrushes evidently thought it best to give the immediate surroundings of these birds a wide berth, and our Strawberries were by these means very much preserved!—W miller, Berkswe.—*Gardeners' Chronicle*. Aug. 16

TO THE PLANTING WORLD.

Seeds & Plants of Commercial Products.

Hevea Brasiliensis.—Orders being booked for the coming crop August-September delivery 1902, booking necessary before the end of April, quantities of 100,000 and over at special low rates. Plants available all the year round, 100,000 and over at special low rates. A leading Rubber planter in Sumatra, who purchased 50,000 seeds in 1899, and 100,000 in 1900, writes us, under date 15th November, 1900:—"I received your letter of 20th October, from which I learn that you added another case of 5,000 seeds to replace the loss, &c. I am satisfied hereby, and even after this adding I am satisfied by the whole delivery of this year." Special offer, post free on application.

Castilloa Elastica.—True superior variety cultivated in Mexico, seeds from specially reserved old untapped trees. Orders booked for August-September delivery 1902, immediate booking necessary; large quantities on special terms; Plants in Wardian cases.

A foreign firm of Planters writes under date 11th October, 1901:—"We beg to enquire whether you would procure us 100,000 Castilloa seeds, in which month we might expect them, and what would be the average price." Special offer, post free on application.

Manihot Glaziovii.—Seeds and Plants available all the year round, 100,000 and over at special low rates. A Mexican planter in sending an order for this seed wrote on the 22nd August, 1900:—"If they arrive fresh and germinate easily I may send you larger orders, as they are for high ground where the Castilloa does not thrive."

Ficus Elastica.—Seeds available in May-June; booking necessary before the end of March; also plants.

Mimusops Globosa (Balata) wood of the tree is much sought for buildings, fruits sweet like a plum and eaten, oil from seeds, said to yield as much as 45 lbs. of dry rubber per tree per annum, the milk is drunk and when diluted with water used as cow's milk, grow from sea-level up to 2,000 feet, orders being booked for seeds and plants, price on application.

Cinnamomum Zeylanicum (Cinnamon superior variety).—New crop of seed in April to June; bookng necessary before the end of February, also plants.

Coffee Arabica, Liberian Hybrid and **Maragogopie Hybrid.**—New crop March-April; immediate booking necessary.

A foreign Agricultural Department writes dating 9th September, 1901:—"Please accept our order for 175 lbs. of Tea seed and for 2,000 Coffee beans. In regard to Coffee seed I would say that this will be the first importation made by this department, and we will leave the selection of the varieties to be sent to your judgment."

OUR DESCRIPTIVE PRICE LISTS.

The following six Descriptive Price Lists are now being forwarded with Circulars and special offer of Seeds and Plants of Rubber and other Economic Products:—

1. Tropical Seeds and Plants of Commercial Products, enlarged edition for 1902.
2. Seeds and Plants of Shade, Timber, Wind-Belts, Fuel and Ornamental Trees, Trees for Roadsides, Parks, Open Spaces, Pasture Lands, Avenues, Hedges, and for planting among crops (Tea, Coffee, Cacao, Cardamoms, &c.)
3. Seeds and Plants of Tropical Fruit Trees including Mango grafts.
4. Bulbs, Tubers and Yams.
5. Orchids—Ceylon and Indian.
6. Seeds and Plants of Palms, Calamus, Pandanus, Cycads, Tree and other Ferns, Crotons, Roses, Dracinas, Shrubs and Creepers.

Special Arrangements made with foreign Governments, Botanical and Agricultural Departments, Planters and others for supplying seeds and plants of Commercial Products in large quantities.

"SOUTH AFRICA."—The great authority on South African affairs of 25th March, 1899, says:—"An interesting Catalogue reaches us from the East. It is issued by WILLIAM BROTHERS, Tropical Seed Merchants of Henaratgoda, Ceylon, and schedules all the useful and beautiful plants which will thrive in tropical and semi-tropical regions. We fancy Messrs. Williams should do good business, for now that the great Powers have grabbed all the waste places of the earth, they must turn to and prove that they were worth the grabbing. We recommend the great Powers and Concessionaries under them to go to William Brothers."

Agents in London:—MESSRS. P. W. WOOLLEY & Co., 90, Lower Thames Street.

Agent in Colombo, Ceylon:—E. B. CREASY, Esq.

Agent in British Central Africa:—T. H. LLOYD, Esq., Blantyre.

Telegraphic Address: J. P. WILLIAM & BROTHERS,

WILLIAM, HENARATGODA, CEYLON. *Tropical Seed Merchants,*

Liber's, A.I. and A.B.C. Codes used. HENARATGODA, CEYLON.

ST. HELIER'S TEA COMPANY, LTD.

ANNUAL REPORT.

ACREAGE.

250	acres in bearing.		
29	do	planted in	1896.
34	do	planted in	1898.
313	acres.		
114	acres Jungle, &c,		
Total 427	acres.		

The Directors have now the pleasure to submit their Tenth Annual Report to the 30th June last, from which it will be seen that the debit balance of R1,776·41, being loss on last year's working, has been wiped out and a small credit balance of R99·19 remains in hand to be carried forward.

The crop, which was originally estimated at 105,000 lb. of made tea, has turned out only 97,288 lb, realising an average price of 34·66 per lb., as against 33·03 last year.

The cost of tea in Colombo, exclusive of the sum of R1,453·06 expended on capital account, works out at 24·43 cents per lb., as against 28·05 cents per lb. last season.

With reference to the loan of £3,000 on the security of the Company's estate, the mortgagees having decided to call this up on 15th October next, and the Company not being in a position from a financial point of view to meet the same, steps are being taken to replace the mortgage; and it is not anticipated that there will be any difficulty in so doing.

Mr H G Bois retires from the Board by rotation; but, being eligible, offers himself for re-election.

The shareholders will have to elect an Auditor for season 1902-03.—By order,

BOIS BROTHER & CO., Agents and Secretaries

WANARAJAH TEA COMPANY OF CEYLON, LTD.

REPORT OF THE DIRECTORS.

Acreage.

Tea in bearing	1,028 acres		
Planted in 1896	12 do		
Do 1898	20 do		
		1,060 acres in tea.	
Timber Trees	..	20	do.
Forest	..	27	do.
Grass not available	..	27	do.
Total	..	1,134	acres.

The Directors have the pleasure of presenting to the shareholders the report, balance sheet and profit and loss account for the year ending 30th June, 1902.

The crop harvested amounted to 442,887 lb., against an estimate of 440,000 lb, The crop for 1901 was 436,945 lb.

351,617 lb. have been sold at an average of 44·70 cents.

Manure.—The estimate provided for 370 acres. The acreage completed was 389, at a cost of R10,077·23.

Factory and Machinery.—During the past season the Factory has been extended, and the Machinery increased at a cost of R12,907·32, which amount is debited to capital account.

After paying off an interim dividend of 5 per cent, and allowing 5 per cent depreciation on buildings and 10 per cent on machinery, there remains the sum of R75,884·03, including the balance brought forward, R36,087·77, which the Diretors recommended to be applied as follows:—

To a final dividend of 10 per cent, making a total of 15 per cent for the year	R37,800·00
To be carried forward	38,084·03
	R75,884·03

The estimated crop for season 1902-1903 is 450,000 lb. of made tea.

The Visiting Agent's reports can be seen by shareholders at the Company's Offices.

Mr J W Vanderstraaten retires from the Board by rotation, but is eligible for re-election.

The election of an Auditor for the current season rests with the shareholders.—By order of the Board,

BAKER & HALL, Agents and Secretaries.

CLUNES ESTATES CO. OF CEYLON, LTD.

REPORT OF THE DIRECTORS.

Clunes Division.

Superintendent:—R. O. De Saram, Esq.

Tea in bearing	..	390	acres.
Forest ...	...	174	do.
Total	..	564	acres.

Erracht Division.

Superintendent:— B. Alleyn, Esq.

Tea in bearing	..	501	acres.
Forest and Waste land	...	244	do.
Total	..	745	acres.
Grand total	...	1,309	acres

The Directors now submit to the shareholders the accounts and balance sheet of the Company for the year ending 30th June, 1902.

The total quantity of crop secured amounted to 364,941 lb. of tea a very disappointing result, being 88,059 lb. short of the estimate. The shortage was mainly due to the unfavourable flushing weather experienced in the first six months of the financial year. In spite of the smaller yield the cost of production compares well with most other estates in the District *i. e.* 21·17 cents per lb., whilst the nett average price realised was 29·03 cents per lb., against 25·60 cents per lb. obtained last year.

Capital Expenditure was incurred to the extent of R5,346·83 in providing increased withering accommodation on Erracht estate.

Depreciation of buildings and machinery is allowed for on the usual scale, and the Directors consider it advisable to put aside a sum of R1,500 against doubtful Coast advances.

After making the provisions alluded to above the result of the year's working shews a nett profit of R14,804·09. To this must be added the balance brought forward from last year, bringing the total to credit of Profit and Loss Account to R19,175·10.

In view of the present uncertainty regarding the immediate future of the Tea Market, and taking into consideration a rather sharp attack of helopeltis from which Clunes estates is at present suffering, the Directors consider it advisable to transfer R15,000 to Extension Fund, (thus obviating the necessity of borrowing money on capital account) and to carry forward the balance *i.e.* R4,175·10 to current year's account.

No Capital Expenditure is anticipated for this year, and the crop is estimated at 417,400 lb. of tea against a Working Expenditure of 82,918·37.

In terms of the articles of Association Mr V A Julius now retires from the Board but is eligible for re-election.

The appointment of an Auditor for the current year will rest with the meeting.—By order of the Directors, Whittall & Co., Agents and Secretaries

THE PENRHOS ESTATES COMPANY OF CEYLON, LIMITED.

REPORT OF THE DIRECTORS.

Directors:—E M Shattook, Esq and G W Suhreu, Esq.

The Directors have pleasure in laying before the Shareholders their Report and Accounts for the year ended 30th June, 1902, duly audited.

The amount of Tea secured was 237,229 lb.—210,120 lb on Estate account as against an Estimate of 207,000 lb, shewing an increase over last season of 10,977 lb, and 27,109 lb manufactured from bought leaf, a decrease as compared with last season of 7,919 lb.

The Comparative Table of the Estate Tea for the past six seasons is appended, and will doubtless be found of interest:—

	Crop in lb.	Cost laid down in Colombo.	Or without Manure.	Net Av. Price.
1896-1897	155·625	27·52	26·31	36·42
1897-1898	145·250	26·23	25·65	39·12
1898-1899	158·106	25·41	24·05	41·03
1899-1900	196 554	23·74	22 32	37·46
1900-1901	199.143	26·29	23·88	34 89
1901-1902	210·120	22·39	21·50	32·94

The total Crop secured cost, inclusive of Manure, 22·72 cents per lb. laid down in Colombo, and realised a net average price of 32·30 cents. Included in the Expenditure is a sum of R536·18, which has been spent in re-draining a further portion of the Estate. This work is being steadily proceeded with, some 199 acres having been treated up to date, and the improvement in the appearance of the bushes on those fields where the work has been carried on is already most marked. A sum of R933·09 has also been spent during the year on the upkeep of young clearings.

After payment of the Interest on Debentures, viz: R3,030·00, the nett Profit for the year comes to R16,727·52, or slightly over 11 per cent on the Capital of the Company. To this must be added the amount brought forward from the previous season, viz: R1,142·38, making the total amount available for distribution R17,869·90.

The Directors recommended that this be apportioned as follows:—

	R.
By payment of a dividend of 7 per cent	10,500·00
By payment of a bonus to Superintendent	1,250·00
By placing to Reserve Fund	2,000.00
By carrying forward to next account	4,119·90
	17,869·90

The acreage of the Company's estates is as follows:—

Old Tea	..	548¼	Acres.
Tea under 4 years	..	7¾	do
Tea under 2 years	..	44	do
		600	Acres.
Forest	..	42	do
Chena &c.	..	296	do
Total	..	738	Acres.

Mr E M Shattock retires by rotation from the Board of Directors but, being eligible, offers himself for re-election.

It will also be necessary to appoint an Auditor for season 1902-3.—By order of the Directors, LEE HEDGES & Co., Agents and Secretaries.

Colombo, August 18th, 1902.

HAPUGAHALANDE TEA COMPANY, LTD.

Report of the Directors presented to the eighth annual ordinary general meeting of shareholders held on Saturday, 30th August, 1902, at 12-30 p.m.

Your Directors beg to submit their Annual Report and Accounts for the twelve months ending 30th June, 1902.

The quantity of Tea manufactured for the season (including estate and brought leaf, but exclusive of that manufactured for other estates) was 135,150 lb as compared with 181,020 lb in 1900-1901. The serious falling-off in crop was due to the abnormally unfavourable weather experienced during the first few months of the period under review.

Estimating the unsold tea at a safe valuation, the amount relised for this product has been R41,392·98, equal to an average of 30·63 cents per lb.

After setting aside R3,293·58 for depreciation on buildings and Machinery, the sum available for distribution (including R5,492·13 brought forward from last account) is R14,658·96. From this sum the Directors recommended payment of a dividend of 5 per cent, absorbing R8,5000 and leaving R5,158·96 to be carried forward.

In terms of the Articles of Association Mr Keith Rollo retires from the Board of Directors and is eligible for re-election.

The appointment of an Auditor for the current season will rest with the meeting.

LEWIS BROWN & CO.,
Agents and Secretaries.

EILA TEA COMPANY.

DIRECTORS' REPORT.

Messrs. G F Walker, S Bois and H G Bois.

The Directors herewith submit their report and accounts for the year ending 30th June, 1902.

The following figures show the result of the year's working on the Company's estates:—

	Estimated Crop.	Crop. realised.	Cost per b. in Colombo.	Price realised.
Eila	252,550	237,175	19·50 cts,	27·22 cts
Kanangama	114,500	86,585	24·73 ,,	28·44 ,,
	367,050	323,760	20·90 cts.	27·54 cts

from which it will be seen that there was a shortfall in crop of 43,290 lb. but the cost of production was only 20·90 cents against an estimated cost of 21·46 cents for which much credit is due to the Superintendent. The shortfall on Kanangama estate was to a great extent due to the severe attacks of helopeltis and partly to an insufficient labour force and steps have since been taken to put this latter on a more satisfactory footing. At the end of the season helopelties was very bad on Kanangama and it is to be hoped that the measures employed by the Superintendent to cope with this pest will be successful. The visiting agent in his last report stated that the general appearance of the tea on both estates was satisfactory.

During the year a further instalment of £500 was paid to the Standard Assurance Company, in reduction of their loan per £7,000. The amount now outstanding is £5,000.

The net profit for the season after providing for 10 per cent depreciation on buildings and machinery is R7,676·83 out of which the Directors propose to pay a bonus to Mr. Dawkin which will

absorb	..	..	R 500·00
to pass the Reserve Account..		..	6,500·00
to carry forward to next season]		..	676·83
			R7,676·83

The estate of the Company now consist of:—

Eila	..	716 acres Tea 5 years old and upwards
		240 do Forest.
		956 acres.
Knangama		215 acres Tea 5 years old and upwards
		108 do Forest.
		323 acres.

The estimates for the current season provide for a crop of 375,180 lb. Tea at a cost of RS3,935·65,

Mr S Bois retires in accordance with the Articles of Association, but being eligible offers himself for re-election. It will be necessary to appoint an Auditor for season 1902-3.—By order of the Directors, J. M. ROBERTSON, & CO., Agents and Secretaries. Colombo, 8th September, 1902.

THE TEA CORPORATION, LIMITED.

ANNUAL REPORT.

The following is the report issued for 18 months ending December 31st :—

Alfred Bull, Cyril Gurney, E H Hancock, T J Lawrance, R R G Norman and V H Smith :—Directors.

Frederick Tatham :—Managing Director in Ceylon. Antony Gibbs & Sons :—London Agents.

Report of the Directors and Accounts for the eighteen months ending 31st December, 1901, to be submitted to the annual general meeting of Shareholders on the 21st July, 1902.

The Directors beg to submit herewith the accounts of the Corporation for the eighteen months ending 31st December, 1901, and they regret to have to report that the conditions prevalent in the Tea Industry during the greater part of that period have led to very serious results, especially in the case of estates such as those of this Company, which in the main produce medium to low-grade tea. As Shareholders are well aware, prices were unprecedentedly low during most of the period in which this last year and a half's tea has been sold. Indeed, they were, generally speaking, fully 1d per lb. below those of the previous year, and even then the market was below normal. The restriction of production which was very generally practised—in view of the accumulation of stocks and the relations of supply and demand—involved an increase in cost, which naturally follows a reduction in crop.

The following figures indicate the results during the past three years :—

	Crop lb.	Cost of Production.		Average Sale Price Net.
1897-98	1,112,606	31	cts. per lb	5d
1898-99	1,234,442	26·10	do	5 15-16d
1899-1900	1,276,139	25·60	do	5 3-16d
1900-01	1,164,435	27·62	do	4½d
(6 months only) 1901	366,816	36·98	do	5 3-8d

From these figures it will be seen that the year's crop up to 30th June was reduced by over 110,000 lb, instead of showing the expected increase; that it cost 2 cents per lb more to produce, owing to this shortage and that the prices obtained for the tea average a figure which barely covers the cost. The prices for the succeeding six months showed a marked improvement, but owing to the usual comparatively small crop, and the extra expenses which are always incurred during that period, the cost per lb is nearly 10 cents higher. It is expected that the crop for the full year will not fall far short of that for 1900-01 and the cost should be reduced to about 26 cents. The falling-off in shipments from India and Ceylon did not immediately produce any effect on prices owing to the large stocks of Tea in London, but an improvement was shown in the late autumn, which has unfortunately not been maintained.

The loss on the Estates for the eighteen months is £318 6s 8d. After adding Debenture Interest, London Expenses, &c., there is a loss of £7,334 12s 5d, after deduction of Balance brought forward.

The expenditure on the work done at the Plumbago pits has been heavy owing to a large inflow of water. The amount of Plumbago won was about 80 Tons, but unfortunately prices ruling were low. In the last few months a considerable amount has been secured, a good vein having been discovered, which, when realised, should considerably reduce the Exploiting Account. The workings are at present let to Natives on satisfactory terms, involving no risk to the Company

As soon as the accounts for the last financial year were complete, the Directors invited all the largest Shareholders to meet and confer with them on the financial position, and in consultation it was agreed that accounts should in future be made up to 31st December; hence the reason that the present accounts cover eighteen months. The Directors before the issue of this Report again met some of the larger Shareholders and consulted with them as to the financial position of the Company. The general feeling was that it was imperative to raise money to strengthen the position of the Company, and that after the matter had been considered at the Annual Meeting some action should be taken.

The Directors retiring in rotation are Mr Vivian Hugh Smith and Mr Reginald R G Norman, who, being eligible, offer themselves for re-election.

The Auditors, Messrs Broads, Paterson & Co, also retire and offer themselves for re-election.—By order of the Board, E. T. BARTLETT, Secretary.

15, Bishopsgate Street Within, E.C.

Dated 8th July, 1902.

PLANTING NOTES.

Cotton Seed—is, of course, known locally, and has been known for generations, as excellent food for cattle. Poonac is nowhere in competition with cotton seed, in the estimation of cart and milch cattle, as any one who has watched them make a rush for the milky morsel must know. But it would appear that only her immediate neighbours have been the chief customers of India for this product. Europe has now awakened to the fact that what was long considered a worthless residue in cotton-cleaning, is useful for man, as well as beast! An Indian contemporary reports that :—

" A remarkable feature of the trade of the past year has been the development of traffic in cotton seed, of which 150,000 tons have been shipped from Bombay in the fifteen months ending last June, compared with only 1,800 tons in 1898-99. The whole has been sent to the United Kingdom, where a brisk demand has sprung up for this previously almost worthless bye-product of cotton industry for such productions, as the manufacture of oil and margarine."

North Borneo and Planting, &c.—are not treated after a flattering fashion by Mr. H. A. B. Fyers, Surveyor, in an interview with our contemporary. Here is the material part :—

" How far have the maritime parts of the country been developed ? ' 'Well—they have a railway there, and it is the funniest railway you ever saw or heard of. It was constructed before cart-roads were made, and the railway does not seem to have any approach roads at all ; and for sixteen miles it runs through a mangrove swamp and into which it almost disappears ! That is the Jesselton-Beaufort railway, and Jesselton is now the capital.' 'What of the agricultural activities and possibilities of the country ? Have you come across many plantations ?' 'Precious few: there is some amount of tobacco cultivation round Darvel Bay—that is the North-east corner of the island—but only this year three or four estates there had their crops destroyed through floods.' 'Who are the planters ?' 'The majority of them are English and Dutch men. The chief centres for the tobacco are Darvel Bay and the valley of the Kinabatangan River.' 'Is there any other agricultural industry ?' 'Not to speak of. The Chinamen grow vegetables, which are all consumed in the country, and there is some fruit culture at Kudat, right to the extreme north of the island."

Monthly Shipments of Ceylon Black Tea to All Ports in 1901-1902.

(Compiled from Chamber of Commerce Circular.)

	United Kingdom.		Russia.		Continent of Europe		Australia.	
	1901. lb.	1902. lb.	1901. lb.	1902. lb.	1901. lb.	1902. lb.	19 1. lb	1902. lb.
January ..	12617540	9056013	727093	612958	104240	151984	740574	714247
February	8333266	7455219	...	919709	135811	121158	1778987	1020948
March ...	7932090	8198179	1288010	896513	82055	91081	2012070	1713916
April ..	8474940	8521388	1297873	988698	111082	93198	2245142	2081904
May ..	10570686	9638555	937138	238239	63310	80669	1644160	2000522
June ...	11425044	12563050	835711	1984976	93699	166479	1730886	1828695
July ..	8488409	10724781	700557	1779011	189567	108785	2593243	1747960
August ...	6030406	7396614	949747	1065599	82595	208894	1612929	1574498
September*	6093129		485429		74896		1779523	
October ..	8989024		762616		181891		1840192	
November	6229472		1018996		190988		1539370	
December	12235867		830226		189520		990563	
TOTAL ..	105,497,339		9,699,734		1,539.986		20,638,208	

	America.		All Other Ports.		Total.	
	1901. lb.	1902. lb.	1901. lb.	1902. lb.	1901. lb.	1902. lb.
January	138235	125795	275598	389215	14603250	11050212
Febuary	272221	115332	453774	385705	10974059	10018071
March	510734	566263	350874	311191	12175833	11777143
April	10030	807390	226776	290137	12365843	12782715
May	288333	242651	306644	436410	13810271	12637046
June	276827	403005	404687	714471	14766854	17660676
July	442100	464858	669163	846036	13083039	15671431
August	266787	461229	227578	678095	9170042	11384929
Septembr	214779		388213		9035969	
October	115545		273928		12163196	
November	504614		183124		9666564	
December	313534		366244		14875954	
Total ...	3,704,335		4.549 627		145,188,244	

Monthly Shipments of Ceylon Green Tea to all Ports in 1901—1902.

	United Kingdom.		Russia.		Australia.	
	1901. lb.	1902. lb.	1901. lb.	1902. lb.	1901. lb.	1902 lb.
January	...	64021	...	..	...	...
February	...	24839	..	4420	...	...
March	75583	14800	...	24210	...	..
April	13016	13676	...	8000	...	...
May	33889	70103	...	..	1714	..
June	12814	87340	..	74225	...	...
July	4478	40574	...	..	...	...
August	...	70900	..	..	...	...
September	5945		...	..	...	...
October	12921		..	..	...	..
November	16540		5615	..	...	..
December	15255		38547	..	1262	..
TOTAL ...	237.231		44,162	...	2,976	...

	America.		All Other Ports.		Total.	
	1901. lb.	1902. lb.	1901, lb.	1902. lb.	1901. lb.	1902. lb.
January ...	...	113332	..	...	...	177353
February ...	...	26480	...	515	..	56254
March ...	227889	62313	12173	100	315660	101423
April ...	79403	53610	7365	9165	99784	84451
May ...	65980	32676	1454	3280	103037	106059
June ...	23046	84184	...	4500	35860	250249
July ...	46896	194016	...	...	51374	234590
August ...	12260	105982	...	1600	12260	178482
September ...	15304	...	...	..	21249	..
October ...	28560	..	...	..	41481	...
November ...	36296	..	...	...	58541	...
December ...	11786	...	7612	...	27011	..
TOTAL. ...	797.796	...	28,609	..	1,110,774	...

* It is impossible to get the figures for the last month in time for publication; but see pages 284, 285 for certain information.

SHARE LIST.

ISSUED BY THE

COLOMBO SHARE BROKERS' ASSOCIATION.

CEYLON PRODUCE COMPANIES.

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Agra Ouvah Estates Co., Ltd.	500	850	900	—
Ceylon Tea and Coconut Estates	500	..	—	—
Castleresgh Tea Co., Ltd.	100	..	—	..
Ceylon Provincial Estates Co. Ltd.	500	505	505	505
Claremont Estates Co., Ltd.	100	—	—	—
Clunes Tea Co., Ltd.	100	50	60	..
Clyde Estates Co., Ltd.	100	25	—	—
Doomoo Tea Co., of Ceylon Ltd.	100	65	—	...
Drayton Estate Co., Ltd.	100	—	..	—
Ella Tea Co., of Ceylon, Ltd.	100	25	—	—
Estates Co of Uva, Ltd.	500	210	...	..
Gangawatte Tea Co., Ltd.	100	—	—	—
Glasgow Estate Co., Ltd.	500	950	..	...
Great Western Tea Co., Ltd.	500	650	—	650
Hapugahalande Tea Estate Co.	200	—	—	—
High Forests Estates Co., Ltd	500	500	—	..
Do part paid	400	—	...	...
Horrekelley Estates Co Ltd	100	105	110	—
Kalutara Co., Ltd.,	500	—	230	..
Kandyan Hills Co., Ltd	100	—	40	—
Kanapediwatte Ltd.	100	45	...	—
Kelani Tea Garden Co., Ltd.	100	..	35	—
Kirklees Estate Co., Ltd.	100	100	—	—
Knavesmire Estates Co., Ltd.	100	...	45	—
Maha Uva Estates Co., Ltd.	500	—		—
Mocha Tea Co., of Ceylon, Ltd.	500	700	—	—
Nahavilla Estate Co., Ltd.	500	250	...	—
Neboda Tea Co., Ltd.	500	—	...	—
Palmerston Tea Co., Ltd.	500	...	400	—
Penrhos Estates Co , Ltd.	100	—	75	—
Pitakanda Tea Company	500	—	...	—
Pine Hill Estate Co., Ltd.	60	—	30	..
Putupaula Tea Co., Ltd.	100	...	..	—
Ratwatte Cocoa Co., Ltd	500	.	...	—
Rayigam Tea Co., Ltd.	100	—	50	—
Rocherry Tea Co., Ltd	100	—	85	—
Ruanwella Tea Co., Ltd	100	...	30	—
St. Heliers Tea Co., Ltd,	500	...	—	—
Talgaswela Tea Co., Ltd.	100	...	...	—
Do 7 per cent Prefs.	100	—	—	—
Tonacombe Estate Co., Ltd,	500	—	350	—
Union Estate Co., Ltd.	500	..	110	—
Upper Maskeliya Estates Co., Ltd.	500	500	550	—
Uvakellie Tea Co., of Ceylon, Ltd	100	...	.	—
Vogan Tea Co., Ltd.,	100	47½	55	—
Wanarajah Tea Co., Ltd.	500	..	900	—
Yataderiya Tea Co., Ltd.	100	285	—	290

CEYLON COMMERCIAL COMPANIES

Company	paid p. sh.	Buyers.	Sellers.	Transactions
Adam's Peak Hotel Co., Ltd.	100	...	30	...
Bristol Hotel Co., Ltd.	100	..	110	...
Do 7 per cent Debts	100	—	...	..
Ceylon Gen. Steam Navigation Co., Ltd	100	—	250	—
Ceylon Ice & Cold Storage Co. Ltd.	100	110	115	..
Ceylon Superæration Ltd.	100	—	40	—
Colombo Apothecaries' Co. Ltd.	100	132½	135	135
Colombo Assembly Rooms Co., Ltd.	20	15	..	..
Do prefs.	20	...	..	...
Colombo Fort Land and Building Co., Ltd.	100	—	—	...
Colombo Hotels Company	100	...	..	280
Galle Face Hotel Co., Ltd.	100	190	200	—
Kandy Hotels Co., Ltd.	100	..	130	130
Kaluganga Nav. Co. Ltd.	60	...	60	—
Mount Lavinia Hotel Co., Ltd.	600	—	300	—
New Colombo Ice Co., Ltd.	100	—	75	...
Nuwara Eliya Hotels Co., Ltd.	30	25	27½	—
Do 7 per cent prefs.	100	—	105	—
Public Hall Co., Ltd.	20	...	—	—

LONDON COMPANIES

Company	paid. p. sh.	Buyers.	Sellers.	Transactions.
Alliance Tea Co., of Ceylon, Ltd.	10	—	—	..
Anglo-Ceylon General Estates Co	100	...	55—60	—
Associated Estates Co., of Ceylon	10	..	1½—2½	—
Do. 6 per cent prefs	10	..	3—5	—
Ceylon Proprietary Co.	1	.	¼—½	..
Ceylon Tea Plantation Co., Ltd.	10	..	23½ - 24	...
Dimbula Valley Co. Ltd	5	..	5—5½	—
Do prefs	5	—	5—6	...
Eastern Produce & Estate Co. Ltd.	5	...	3¼—3¾	.
Ederapolla Tea Co., Ltd	10	...	6—8	...
Imperial Tea Estates Co., Ltd.	10	...	4 4½	—
Kelani Valley Tea Asscn., Ltd.	5	...	3—5	—
Kintyre Estates Co., Ltd.	10	...	6—8	—
Lanka Plantations Co., Ltd	10	..	4	—
Nahalma Estates Co.,Ltd.	1	...	nom	..
New Dimbula Co., Ltd.	1	...	2¾—3	..
Nuwara Eliya Tea Estate Co., Ld.	10	—	9¾	—
Ouvah Coffee Co., Ltd.	10	..	6—7	—
Ragalla Tea Estates Co., Ltd.	10	.	11 -13	—
Scottish Ceylon Tea Co.,Ltd.	10	.	10—15	—
Spring Valley Tea Co., Ltd.	10	...	2—5	—
Standard Tea Co., Ltd.	6	..	10—12	..
The Shell Transport and Trading Company, Ltd.	1	...	2⅞—3⅛	—
Ukuwella Estates Co., Ltd.	25	—	par	...
Yatiyantota Ceylon Tea Co., Ltd.	10	—	5¼	..
Do. pref. 6 o/o	10	...	9—10	...

BY ORDER OF THE COMMITTEE.

Colombo, Oct. 3rd, 1902.

* Latest London Prices

RAINFALL RETURN FOR COLOMBO.

(*Supplied by the Surveyor-General.*)

	1897.	1898.	1899	1900	1901	Av. of 32yrs.	1902
	Inch	Inch	Inch.	Inch.	Inch.	Inch.	Inch
January ..	3·81	2·32	·98	3·72	11·91	3·51	1·95
February ..	1·68	1·98	2·78	0·63	3·55	1·94	4·57
March ..	3·66	4·21	0·88	3·71	5·12	4·76	6·85
April ..	10·97	22·81	6·66	15·12	8·71	11·34	10·01
May ..	8·30	5·80	17·73	10·63	6·28	11 86	11·89
June ..	10·14	10·94	9·23	7·83	5·93	8·28	9·84
July ..	5·24	6·15	1·11	6·77	4·52	4·46	4·63
August ..	9·09	0·97	0·62	7·35	0·46	3·68	2·78
September ..	4·58	6·90	1·48	4·00	3·93	4·94	8·14*
October ...	4·71	20·60	12·99	9·47	3·91	14·03	
November ..	11·66	17·38	8·58	9·25	19·84	12·77	
December ..	8·89	3·05	4·44	5·20	1·70	6·26	
Total..	82·73	103·11	73·48	83·68	75·86	87·83	60·70

* From 1st to 30th Sept. 8·14 inches, that is up to 9-30 a.m. on the 1st Oct.—ED. *C.O.*

CEYLON TEA: MONTHLY SHIPMENTS TO UNITED KINGDOM AND ESTIMATE.

Estimate for Sept. 1902—7 to 7½ mil. lb.
Total Shipments Do 1902—6,750,000 mil. lb.
Do Do Do 1901—6,093,129 lb.
Do Do Do 1900—4,978,006 lb.
[ESTIMATE for Oct. 1902—8 to 8½ million lb.]

KARAMARUDU *Terminalia Tomentosa*), a timber largely grown in the South Canara forests in the Madras Presidency, has, we hear, been pronounced unsuitable for use as railway sleepers. —*Indian and Eastern Engineer* for Sept.

COLOMBO PRICE CURRENT.

(Furnished by the Chamber of Commerce.)

EXPORTS

Colombo, Sept. 29th, 1902.

Cardamoms :—
All ronnd parcel, well bleached per lb. R1·10
Do. dnll medium do. R0·90
Special assortment, 0 and 1 only do. R1·30
Seeds do. R1·05

Cinchona Bark :—
Per unit of Snlphate of Quinine 7c—1½ to 3 per cent.

Cinnamon :—(in bales of 100 lbs. nett.)
Ordinary assortment per lb. 52c. } scarce.
Nos. 1 and 2 only per lb. 60c.
Nos. 3 and 4 only per lb. 48c.

Cinnamon Chips :—(in bgs. of 56 lbs. nett. per candy of 560 lb.) R67·50

Cocoa :—
Finest estate red unpicked per cwt R45·00
Medium do do do R38·00
Bright native unpicked and undried R37·00
Ordinary do do do R28·00

Coconuts—(husked)
Selected per thousand R49·00
Ordinary ,, R46·00
Smalls ,, R34·00

Coconut Cake—
Poonac in robins f. o. b. per ton R80·00
Do in bags none.

Coconut (Desiccated).
Assorted all grades per lb 18¾c. According to quality Cents 16¾ quoted for forwared delivery.

Coconut Oil—
Dealers' Oil per cwt R17·25.
Coconut Oil in ordinary packages f. o. b. per ton R382·50.

Coffee.—
Plantation Estate Parchment on the spot per bus. None
Plantation Estate Coffee f. o. b. (ready) per cwt.—R62·00.
Native Coffee, f.o.b per cwt.—None.

Citronella Oil—
Ready do per lb.—46c Nominal.

Copra—
Boat Copra per candy of 560 lb. R56·00
Calpentyn Copra do do R57·00
Cart do do do R52·50
Estate do do do R56·50

Croton Seed per cwt—R11·00

Ebony—
Sound per ton at Govt. depot—R175·00.—Sales of the 4th August.
Inferior R95·00.—Next Sales on 13th October.

Fibres—
Coconut Bristle No 1 per cwt None
Do ,, 2 None
Do mattress ,, 1 None
Do ,, 2 None
Coir Yarn, Kogalla ,, 1 to 8 R15·00
Do Colombo ,, 1 to 8 R11·00.—Market easier.
Kitool all sizes None
Palmyrah None

Pepper—Black per lb None

Plumbago—
Large lumps per ton R600
Ordinary lumps do R600
Chips do R350
Dust do R250 Prices nominal
Fine qualities very scarce.
Do (Flying) do R125

Sapanwood— per ton R45.—Nominal.

Satinwood (ordinary) per cubic ft. None
Do (Flowered) per cubic ft. None

Tea—	High Grown Average cts	Medium Average. cts	Low Grown Average. cts	
Broken Pekoe and Broken				
Orange Pekoe per lb	..	..	..	
Orange Pekoe do	..	..	..	No sale
Pekoe do	...	..	..	
Pekoe Souchong do	...	..	..	
Pekoe Fannings do	..	..	...	
Broken mixed—dust, &c	...	..	...	

CEYLON EXPORTS AND DISTRIBUTION FOR SEASONS 1901 AND 1902.

COUNTRIES	Black Tea 1902 lbs.	Black Tea 1901 lbs.	Green Tea 1902 lbs.	Green Tea 1901 lbs.	Coffee—cwts. Plantation	Coffee—cwts. N'tive	Coffee—cwts. Total	Cocoa cwts.	C'moms lbs.	Cinnamon Bales lbs.	Cinnamon Chips lbs.	Coconut Oil 1902 cwt	Coconut Oil 1901 cwts	Copra cwts.	Desiccated Coconut lb.	Poonac cwts.	Coconuts No.	Plumbago 1902 cwts	Plumbago 1901 cwts.
To U K.	79139794	77675383	408527	156549	6187	..	6187	26230	287197	251795	129840	184076	169294	12308	6539183	21	7947208	95812	149836
,, Austria	34619	41671	..	..	1	..	1	...	...	5600	36400	10825	5030	6563	120550	...	5510	...	..
,, Belgium	52473	14516	...	..	95	..	95	475	...	84500	133560	1793	3752	18894	157620	74422	140150	9395	14723
,, France	165682	202205	—	..	4	...	4	675	448	45600	22480	238	102	72735	28000	...	66020	1246	286
,, Germany	461063	371164	...	..	26	..	26	3625	90378	551481	421423	8524	8532	114471	1457090	76658	943535	47354	38125
,, Holland	4514	18494	...	..	...	..	..	..	—	33000	180600	..	3716	476	263670	..	..	407	...
,, Italy	13464	11108		..	...	..	..	32	435	171558	127512	1519	4264	..	...	10	11285	7	100
,, Russia	9974146	6959327	106435	..	8	...	8	100	448	130	..	181	134	33136	..	..	...	1678	3713
,, Spain	3281	...	..	..	...	..	..	31	..	195498	64832	..	..	...	10250	..	...	..	...
,, Sweden	56905	37136	...	..	..	..	..	400	...	..	..	828	199	...	36750	..	10080	433	204
,, Turkey	24362	27869	..	.	...	...	..	—	..	112	...	...	...	..	...	...	..	..	...
,, India	679057	953716	22931	16124	68	...	68	5	73490	..	2296	53950	88218	5	...	...	66400	1717	4 5
,, Australia	13740798	15342156	..	1714	1894	14	1908	474	...	3624	21256	.	94	...	530711	21	..	216	13
,, America	3663013	2013234	993970	457984	820	...	820	7	7039	243500	6275	77966	14030	...	1551505	...	99100	19192	131291
,, Africa	435537	250754	1200	..	15	..	15	..	2226	..	..	60	76	..	17660	1	944541	..	...
,, China	3012157	2243626	...	4853	26	..	26	100	7246	16200	112	545	914	..	1918	..	—	797	..
,, Singapore	142969	99103	...	...	1	...	1	5 60	2140	...	..	474	3006	...	..	...	...	...	...
,, Mauritius	50919	29376	..	...	280	..	230	..	..	..	..	...	..	...	..	..	..	..	..
,, Malta	240486	242308	..	...	...	...	..	...	..	...	..	..	..	..	...	..	..	...	..
Total export from 1st Jan to 29th Sept 1902.	111894244	106538166	1593063	637224	9375	14	9389	37214	471046	16025	1146586	340979	301561	258588	10714907	151133	223869	355044	338815

MARKET RATES FOR OLD AND NEW PRODUCTS.

(From Lewis & Peat's Fortnightly Price Current, London, September 10th, 1902.)

	QUALITY.	QUOTATIONS.
ALOES, Soccotrine cwt.	Fair to fine dry ..	70s a 80s
Zanzibar & Hepatic ,,	Common to good ..	20s a 60s
ARROWROOT (Natal) lb.	Fair to fine ..	7d a 8d
BEES' WAX, cwt.		
Zanzibar & Bombay { White ,,	Dingy to Fair	£5 a £6 12s 6d
{ Yellow ,,	Fair ,,	£6 a £6 [illegible]s
Madagascar ,,	Dark to good palish	£6 5s a £6 12s 6d
CAMPHOR, Formosa ,,	Crude and semi-refined	16[illegible]s a 175s
Japan ,,	Fair average quality ..	[illegible]6[illegible]s
CARDAMOMS, Malabar lb	Clipped, bold, bright, fine	1s 9d a 2s
	Middling, stalky & lean	1s a 1s 7d
Ceylon.–Mysore ,,	Fair to fine plump ..	1s a 3s 7d
	Seeds .	1s 3d a 1s 8d
,, Tellicherry ,,	Good to fine ..	1s 6d a 2s
	Brownish .	1s 3d a 1s 6d
,, Long ,,	Shelly to good ..	9d a 2s 9d
,, Mangalore ,,	Med brown to good bold	2s 8d a 2s 11d
CASTOR OIL, Calcutta ,,	1sts and 2nds ..	2⅝d a 2⅞d
CHILLIES, Zanzibar cwt.	Dull to fine bright ...	32s 6d a 40s
CINCHONA BARK.–lb. Ceylon	Ledgeriana Orig. Stem	[illegible]d a 9d
	Crown, Renewed	5d a 7d
	Org. Stem	3½d a 7d
	Red Org. Stem	3⅜d a 4½d
	Renewed	3d a 5¾d
	Root	3¾d a 4d
CINNAMON, Ceylon 1sts per lb.	Ordinary to fine quill	8½d a 1s 6d
2nds	,, ,,	8d a 1s 6d
3rds	,, ,,	7½d a 1s 4d
4ths	,, ,,	7d a 11d
Chips	,, ,,	2½d a 10d
CLOVES, Penang lb.	Dull to fine bright bold	5½d a 1s
Amboyna ..	Dull to fine	4½d a 6d
Zanzibar and Pemba }	Good and fine bright	3 15-16d a 4¼d
	Common dull to fair	3½d a 3⅝d
Stems ..	Fair	2d
COFFEE		
Ceylon Plantation ,,	Bold to fine bold colory	92s 6d a 120s
	Middling to fine mid ..	80s a 100s
	Smalls	47s a 70s
Native	Good ordinary	50s a 60s
Liberian ,,	Small to bold	[illegible]0s a 40s
COCOA, Ceylon ,,	Bold to fine bold	65s a 83s 6d
	Medium and fair	58s a 64s
	Native	50s a 60s
COLOMBO ROOT ,,	Middling to good	[illegible]s a 13s
COIR ROPE, Ceylon ton		nominal
Cochin ,,	Ordinary to fair ..	£13 10s a £18
FIBRE, Brush ,	Ord. to fine long straight	£16 a £19
Cochin ,,	Ordinary to good clean	£20 a £24
Stuffing ,,	Common to fine	£7 a £9
COIR YARN, Ceylon ,,	Common to superior	£15 a £30
Cochin ,,	,, ,, very fine	£12 a £32
do. ,,	Roping, fair to good	£10 a £14 10s
CROTON SEEDS, sift. cwt.	Dull to fair	15s a 25s
CUTCH ,, ,,	Fair to fine dry	23s a 35s
GINGER, Bengal, rough ,,	Fair	40s
Calicut, Cut A ,,	Good to fine bold	[illegible]0s a 90s
B & C ,,	Small and medium	48s a 70s
Cochin Rough ,,	Common to fine bold	41s a 43s
	Small and D's	37s 6d a 40s
Japan ,,	Unsplit	33s a 34s
GUM AMMONIACUM ,,	Sm. blocky to fine clean	10s a 35s
ANIMI, Zanzibar ,,	Picked fine pale in sorts	£10 7s 6d a £18
	Part yellow and mixed	£7 a £9
	Bean and Pea size ditto	70s a £9 2s 6d
	Amber and dk. red bold	£5 15s a £8
	Med. & bold glassy sorts	90s a £7 17s 6d
Madagascar ,,	Fair to good palish ...	£4 a £8
	,, ,, red ...	£4 5s a £7 10s
ARABIC E. I. & Aden ,,	Ordinary to good pale	25s a 37s 6d
Turkey sorts ,,		30s a 37s 6d
Ghatti ,,	Pickings to fine pale ...	10s a 2[illegible]s
Kurrachee ,,	Good and fine pale ...	27s 6d a 30s
	Reddish to pale selected	10s a 25s
Madras ,,	Dark to fine pale ...	18s a 25s
SSAFŒTIDA ,,	Clean fr. to gd. almonds	45s a 75s
	Ord. stony and blocky	9s a 30s
KINO ,,	Fine bright	4½d a 7d
MYRRH, picked ,,	Fair to fine pale	75s a 120s
Aden sorts ,,	Middling to good	50s a 70s
OLIBANUM, drop ,,	Good to fine white	42s a 50s
	Middling to fair	28s a 42s 6d
pickings ,,	Low to good pale	20s a 26s 6d
siftings ,,	Slightly foul to fine	18s a 23s
INDIARUBBER, Ceylon	Fine (grwn. fr. Para seed)	2s 0½d a 3s 10d
Assam	Good to fine	2s a 2s 3d
	Common to foul & mxd.	7d a 1s 6d
Rangoon	Fair to good clean ...	2s a 2s 4d
Borneo	Common to fine	6d a 2s 2d

	QUALITY.	QUOTATIONS
INDIARUBBER (Contd.)		
Java, Sing. & Penang lb.	Foul to good clean ...	8d a 2s 1d
Mozambique ,,	Good to fine Ball ...	2s 6d a 2s 9d
	Ordinary to fair Ball ...	1s 10d a 2s 2d
	Low sandy Ball ...	9d a 1s 6d
	Sausage, fair to good ..	1s 10d a 2s 7¾d
	Liver and Livery Ball ..	1s 9d a 2s 2d
Nyassaland	Fair to fine ball ..	2s 3d a 2s 7½d
Madagascar	Fr to fine pinky & white	2s a 2s 8d
	Fair to good black ..	1s 1d a 1s 6½d
	Niggers, low to fine ..	7d a 1s 9d
INDIGO, E.I	Bengal—	
	Shipping mid to gd violet	3s 5d a 3s 9d
	Consuming mid. to gd.	2s 11d a 3s 3d
	Ordinary to mid.	2s 5d a 2s 10d
	Mid. to good Kurpah	1s 6d a 2s
	Low to ordinary	9d a 1s 3d
	Mid. to good Madras	1s 4d a 1s 10d
MACE, Bombay & Penang per lb.	Pale reddish to fine	2s a 3s
	Ordinary to fair	1s 4d a 1s 11d
	Pickings	1s 3d a 1s 4d
MYRABOLANS, Madras } cwt	Dark to fine pale UG	5s a 6s
	Fair Coast	4s 6d a 5s
Bombay ,,	Jubblepore	4s 6d a 5s 6d
	Bhimlies	4s a 6s
	Rhajpore, &c.	3s 6d a 5s 6d
Bengal ,,	Calcutta	3s 6d a 5s
NUTMEGS— lb.	64's to 57's	2s 6d
Bombay & Penang ,,	110's to 65's	1s 1d a 2s 5½d
	160's to 115's	6d a 1s
NUTS, ARECA cwt.	Ordinary to fair fresh	14s a 18s
NUX VOMICA, Bombay per cwt.	Ordinary to middling	5s 6d a 6s
Madras	Fair to good bold fresh	7s a 10s
	Small ordinary and fair	5s a 6s 9d
OIL OF ANISEED ,,	Fair merchantable	4s 4d
CASSIA ,,	According to analysis	2s 3d a 2s 6d
LEMONGRASS ,,	Good flavour & colour	5d
NUTMEG ,,	Dingy to white	1¼d a 2½d
CINNAMON ,,	Ordinary to fair sweet	3¼d a 1s 3d
CITRONELLE ,,	Bright & good flavour	9½d a 10d
ORCHELLA WEED—cwt		
Ceylon ,,	Mid. to fine not woody...	10s a 12s 6d
Zanzibar ,,	Picked clean flat leaf ...	10s a 14s
	,, wiry Mozambique	10s a 11s
PEPPER–(Black) lb.		
Alleppee & Tellicherry	Fair to bold heavy ...	6d a 6¼d
Singapore	Fair	6¼d
Acheen & W. C. Penang	Dull to fine	4¼d a 5¾d
PLUMBAGO, lump cwt.	Fair to fine bright bold	30s a 35s
	Middling to good small	20s a 28s
chips	Dull to fine bright ..	9s a 15s
dust	Ordinary to fine bright	3s 9d a 7s 6d
SAFFLOWER	Good to fine pinky ..	65s a 75s
	Inferior to fair .	40s a 60s
SANDAL WOOD—		
Bombay, Logs ton.	Fair to fine flavour ..	£15 a £30
Chips ,,	... ...	£5 a £8
Madras, Logs ,,	Fair to good flavour ..	£15 a £30
Chips ,,	Inferior to fine ...	£4 a £8
SAPANWOOD Ceylon ,,	Fair to good ..	£5 a £5 10s
Manila ,,	{ Rough & rooty to good	£4 10s a £5 15s
Siam ,,	{ bold smooth...	£7
SEEDLAC cwt.	Ord. dusty to gd. soluble	11[illegible]s a 117s 6d
SENNA, Tinnevelly lb.	Good to fine bold green	5½d a 8d
	Fair greenish	3½d a 5½d
	Common dark and small	1½d a 3d
SHELLS, M. o'PEARL— Bombay cwt.	Bold and A's / D's and B's / Small ...	48s a 120s
Mergui ,,	Small to bold ..	£7 15s a £9 15s
Mussel ,,	Small to bold ...	17s a 55s
TAMARINDS, Calcutta...	Mid. to fine bl'k not stony	8s a 10s
per cwt. Madras	Stony and inferior ..	4s 6d a 6s
TORTOISESHELL— Zanzibar & Bombay lb.	Small to bold dark mottle part heavy	17s a 22s
TURMERIC, Bengal cwt.	Fair ...	14s a 16s
Madras ,,	Finger fair to fine bold bright	10s a 14s
Do. ,,	Bulbs ..	10s a 12s
Cochin ,,	Finger ..	10s a 12s
	Bulbs ...	9s a 9s 6d
VANILLOES— lb.		
Mauritius ... } 1sts	Gd. crysallized 3½ a 9 in	6s 6d a 22s 6d
Bourbon ... } 2nds	Foxy & reddish 3½ a 8 ,,	5s a 15s
Seychelles 3rds	Lean and inferior ...	3s a 7s 9d
VERMILION lb.	Fine, pure, bright ...	3s
WAX, Japan, squares cwt	Good white hard ...	50s a 55s

THE

AGRICULTURAL MAGAZINE,

COLOMBO.

Added as a Supplement Monthly to the "TROPICAL AGRICULTURIST."

The following pages include the Contents of the *Agricultural Magazine* for October :—

Vol. XIV.] OCTOBER, 1902. [No. 4.

THE TAMARISK.

THE Tamarisk (*Tamarix gallica*), known to the Tamils as *kiri*, is described by Trimen as a large shrub or tree with slender branches occurring on the sea coast chiefly on the North-West, between Chilaw and Jaffna. It is one of the few forms of vegetation which are suitable for planting in exposed situations along the sea borde, with the special object of arresting drifting sands.

In an article appearing in the August number of the *Agricultural Gazette of New South Wales*, some interesting facts relating to this Ceylon plant are given by the writer, Mr. W. S. Campbell. We read here of the Tamarisk being planted in the most exposed situations on the coast, at the mercy of severe gales and strong winds with constant encroachment of sand, and yet growing from the start. Under favourable conditions the plant is said to grow into an ornamental and shapely tree attaining sometimes a height of 20 to 25 feet. Another name for it is the "flowering cypress."

In Dr. Hedin's book "Through Asia" the Tamarisk is referred to as the plant which encroached furthest into the awful desert regions traversed by the traveller.

The specific name *gallica* indicates the fact that the plant produces galls which are sometimes used in medicine and as deying agents where astrigency is wanted. In medicine it is employed as a tonic, while it is a substitute for hops in making beer in Denmark. The ashes of the plant, when found growing near the sea, are found to contain a large proportion of sulphate of soda, to obtain which it may be profitably burnt. The abundance of this salt is said to explain the use of the plant as a diuretic agent.

Mr. Campbell mentions the curious fact that the Tamarisk produces a kind of manna when punctured by an insect known as *Coccus manniparus*, but distinguishes this from the manna of the Old Testament which is traced to a lichen.

The Tamarisk is mentioned by Homer and other ancient poets, and has been long held to be a celebrated medical plant by the Arabians.

It is interesting to note the plants used in New South Wales for planting along the sea coast with the double object of serving as wind belts and arresting shifting sand. There are marram and spinifex grass (planted on the sandy bank along the beach) and (higher up) *Pinus maritima*, *Ficus macrophylla*, *Metrosideros tomentosa*, *Lagunaria Pattersonia*, *Arundo donax*, *Pampas grass*, *&c.*

Seeds of marram grass were not long ago distributed by the Botanical Department for trial. *Arundo donax* is familiar enough as an introduced plant, while *spinifex squarrosus* sometimes called "water-pink" is that quaint form of vegetation which rejoices in the quainter native name of "Maha-rawanarewula" meaning "the great beard of Ravena or Rama."

CURE FOR TAPE WORM.

(*To the Editor, "Agricultural Magazine."*)

Ratnapura, 30th Sept., 1902.

SIR,—For the benefit of your readers I give you a better cure for tape worm in dogs than arecanut, which often harms the dog. I got the recipé from Dr. Carberry. It is powdered pumpkin seed. Give a teaspoonful or more with every meal, and have patience. It is tasteless and harmless. Watch for the head of the worm.—Yours faithfully,

G. S. SAXTON.

[We are glad to learn of this very simple and safe remedy —ED. *A.M.*]

RAINFALL TAKEN AT THE SCHOOL OF AGRICULTURE DURING THE MONTH OF SEPTEMBER, 1902.

1	Monday ...	·14	16	Tuesday ...	·02
2	Tuesday ...	·02	17	Wednesday	·11
3	Wednesday ...	1·60	18	Thursday ...	Nil
4	Thursday ...	2·37	19	Friday ..	Nil
5	Friday ...	·05	20	Saturday ...	·10
6	Saturday ...	·11	21	Sunday ...	·06
7	Sunday ...	1·52	22	Monday ...	Nil
8	Monday ...	·22	23	Tuesday ...	Nil
9	Tuesday ...	·27	24	Wednesday	Nil
10	Wednesday ...	1·40	25	Thursday ...	Nil
11	Thursday ...	1·21	26	Friday ...	Nil
12	Friday ...	·35	27	Saturday ...	Nil
13	Saturday ...	·85	28	Sunday ...	Nil
14	Sunday ...	·22	29	Monday ..	Nil
15	Monday ...	.05	30	Tuesday ...	·13
			1	Wednesday	·03
				Total ...	10·69
				Mean ...	·36

Greatest amount of rainfall registered in 24 hours on the 4th September, 1902, 2·37 inches.

Recorded by ALEX. PERERA.

OCCASIONAL NOTES.

In the *Farmer's Bulletin*, No. 78, issued by the United States Department of Agriculture, is described the process of manufacture of a new fungicide, named *Sar*, said to be very effective. It is made as follows:—"Place 15 lbs. of flower of sulphur in a barrel, mix thoroughly with ½ lb. of finely-powdered resin, stir well with 3 quarts of water, which should make a thick paste. The paste must not be thin and watery, nor so dry as to crumble to powder when stirred. Then add 10 lbs. of caustic soda and stir well. After from three to fifteen minutes the mass turns a reddish brown and boils violently, and must be stirred well, preferably with a broad paddle to prevent it from running over. After it has ceased boiling, add slowly about two gallons of water hot if possible, but cold will do, and then carefully pour off into another vessel marked to hold 6 gallons, and add hot water till the six-gallon-mark is reached. This gives a stock solution, which must be kept in tightly corked jars or in closed barrels or kegs, since it spoils if it comes into contact with the air. It is also decomposed if it touches metals." Of this stock solution 1½ pints to 50 gallons of water is recommended for treating seed oats for loose smut, the seed to be soaked for 24 hours. A stronger solution, one gallon in 50 of water, can also be employed, in which case two hours will be sufficient for soaking.

Since referring to *Spinifex squarrosus* in our General Items column, we have discovered a curious error in the note on this grass which occurs in Trimen's Flora, Vol. V., on page 174. All who live by the sea are no doubt familiar with the plant, called "water pink," probably owing to the resemblance of the ashy green foliage to the common pink of our gardens. The peculiar crackling noise produced when the dry plant is thrown into the fire, has, we feel sure, often served as a substitute for the bursting of the Christmas cracker to the fisherman's child, while the flying ball of the flower head is supposed to illustrate "the rolling things before the wind" and "the wheel before the wind" mentioned in the Bible. The curious error we have referred to above is the translation of the Sinhalese name Maha-Rawana-Rewula into the great *bund* of Ravana" instead of (as Ferguson correctly puts it) "the great beard of Ravana.' One can understand the simple mind of the native seeing a resemblance in the coarse hard grass to the grisly beard of the hairy Rakshia hero, but where does the word *bund* come in at all?

Regarding the well-known Mauritius or water grass (*Panicum muticum, P. Barbinode*, but not referred to as *P. Molle*, though this is the name given in Trimen's "Catalogue"), we read in the "Ceylon Flora" that "It is singular that neither Thwaites, Trimen or Ferguson give a Sinhalese or Tamil name for it." But on turning to Trimen's Catalogue it will be found that he gives the common enough Sinhalese name *Diyatanakola*. Its omission from Watts' Dictionary (so stated in the 'Flora') is due to the fact that the grass was practically unknown in India, where our other cultivated fodder grass *Panicum maximum*, Guinea grass (whose native name is, by the way, given in the "Flora" as *Ratajana* instead of *Ratatana*) is common enough. About ten years ago the then Superintendent of the Government Diary (Mr. C. Drieberg) supplied the Poona Farm with the grass for planting at Poona where it was not heard of before.

Imperata arundinacea, or "Illuk" grass, is figured in the July number of the Journal of the Department of Agriculture of Victoria, where it is also known as the Lalang or Blady grass. The following notes are supplied: "The Lalang grass is a native of all the Australian Colonies . . . . and is very conspicuous in a paddock on account of its large white flower spike. It is by no means a good fodder on account of its hardness, though stock will eat in a young state, and especially after a bush fire. It is often used with advantage for thatching. It is also useful for binding sand in moist localities." So that there is a good word for even such a pest as "Illuk," which some one facetiously remarked was a corruption of "Ill-luk" which it certainly brings to the unfortunate planter upon whose land it enroaches!

CASTOR OIL.

Some time ago we referred to the recommendation of an Agricultural expert that all backward parts of estates should be put under the Castor Oil plant, as the oil is a marketable product, while the refuse cake (poonac) is a

valuable manure. We have been collecting a small quantity of seed of the large fruited variety of the Castor from plants grown in the Colombo stock, and will be glad to give these away to any one desiring to have seeds. The variety is a fairly high shrub and rather a good shade tree.

In the *Queensland Agricultural Journal* for July we are told that 2*s*. 9*d*. per gallon is the price the oil may be expected to bring in Australia, though buyers would probably be willing to pay 3*s*. to local manufacturers, as the loss by leakage in tins from Europe is very considerable. The quotation is for lubricating not medicinal oil.

The following note about the extracting of the oil (from the *Queensland Agricultural Gazette* for June last) will be of interest:—Briefly the operations of oil extraction are by expression, by boiling with water, or by the agency of alcohol. A comparatively simple process can be tried by any one interested, and a good oil should result if the seed is of the right variety.

Fisrt, cleanse the seeds from fragments of the husk and from dust, and submit them to a gentle heat, but not greater than can be borne by the hand, which process makes the oil more fluid and more easily expressed. A whitish oily fluid is thus obtained, which is boiled with a large quantity of water, and all impurities are skimmed off as they rise to the surface; the water dissolves the mucilage and starch, and the albumen is coagulated by the heat, thus forming a layer between the oil and the water; the clear oil is then removed and boiled with a small quantity of water until aqueous vapour ceases to rise and a small quantity taken out in a phial remains perfectly transparent. The effect of this is to clarify the oil and rid it of volatile acid matter. Care is necessary not to carry the heat too far, as the oil would acquire a brownish colour and an acid taste.

In India the seed is first shelled and then crushed between rollers, placed in hempen cloths and pressed. The oil is afterwards heated with water in a tin boiler until the water boils. This serves to separate the mucilage and albumen, the product being then strained through flannel and put into canisters. Any oil-press would suffice for extracting oil for ordinary purposes, and by decantation and some process of filtration it could be purified. Cheap wooden rollers would serve the purpose, and these could be driven by a horse-gear, after the fashion of driving the old horse-mills for crushing sugar-cane.

We should very much like to see Castor oil cultivation given a fair trial on a few acres of land that are found unsuitable for the regular crops of the country, so as to prove the value of the produce, both oil and poonac, per acre.

THE BULRUSH MILLET.

Pennisetum Typhoideum, as the plant is scientifically named, is also known as the Bulrush Millet, Cumboo or spiked millet, and in many parts of India as Bajri or Bajra. In the Bombay Presidency the area occupied by it is considerably over 4 million acres, and in many parts forms the staple food of the people. In the Madras Presidency the area under Kambu (as it is there called) is nearly 2½ million acres. In the North-Western Provinces and other parts of the Indian Peninsula it is also grown to a large extent.

The following are the uses of the plant as enumerated by Dr. Watt, Reporter on Economic Products to the Government of India:—

Food.—The grain is chiefly used by the lower classes, and in many parts of India it is their principal food. It is supposed to be heating, and is, therefore, in Northern India consumed mostly in the cold weather. The flour, made into bread or cakes with butter milk is the staple food of many, and is more nutritious than rice. In Khandesh it is often eaten with butter and various condiments by the well-to-do. The following is the composition of a sample of the unhusked grain according to an analysis made by Professor Church:—

Water	11·3	%
Albuminoids ...	10·4	,,
Starch	71·5	,,
Oil	3·3	,,
Fibre	1·5	,,
Ash	2·0	,,

The nutrient ratio being 1: 7·6, and the nutrient value 89½. The grain contains ·42 per cent of potash and ·68 per cent of phosphoric acid.

Fodder.—It is occasionally grown for green fodder, but the stalks, after the grain has ripened, are more or less utilized as fodder in various parts of India. Sometimes the straw is carefully stacked and preserved to be chopped up and given to cattle with green fodder.

In an interesting report on South Indian Fodders, with analyses by Dr. Van Geyzel, M.B., C.M., F.C.S., F.I.C., Chemical Examiner, Madras, the following is given as the composition of Cumboo straw: Moisture, 7·07; Ash, 8·04; Fibre, 37·63; Fat, 1·31; Carbohydrates, 43·65; Albuminoids 1·94; Nitrogen in non-Albuminoid compounds, ·33; Albuminoid ratio, 1·44. If the nitrogen found in the non-albuminoid compounds be calculated in the usual way as albuminoids and the nutritive relation worked out, the result shows that Cumboo contains 4·02 albuminoids and its albuminoid ratio will be 1·21. In Trimen's Flora we read that Cumboo is cultivated in the hot region. He describes it as a widely cultivated millet in the old world from Italy to China, especially in Africa, and records the interesting fact that the grain, like Canary seed, was used for feeding the carrier pigeons which were employed before the introduction of the telegraph in carrying news from Galle to Colombo.

POULTRY NOTES.

We have received a copy (September) of the *Indian Fowl Fancier and Farmers' Journal* edited by H. E. Abbott. It is a useful publication which supplies a decided want, and is neatly got up.

The September number of the above is largely taken up with Ceylon news and notes, dealing chiefly with the Shows that took place last August. The idea of the Ceylon Poultry Club adopting the Indian Fowl Fancier (with pages devoted to Ceylon) as its official organ is an excellent idea. It is no easy matter to run a monthly magazine with anything like success.

The *Adelaide Observer* has the following amusing note about the poultry tick and bug:—

As there is some diversity of opinion with reference to the poultry tick and bug, some holding that they are different, while others agree that they are the same thing, it was thought an opportune time to discuss the matter from a scientific point of view at a meeting of practical poultry men recently held in Adelaide, and a well-known scientific man was asked to give his opinion upon the matter. He stated by explaining that the big mother tick was the bug, but he got no further as he was unable—owing to the sounds of laughter—to proceed even to tell what was his opinion of the father tick.

Fowls like newly-cut grass; give them all they want of it. The clippings from a lawn-mower are just the thing for them. Dry chillies broken up may be fed to poultry in moderate quantities with good results, but do not make their food too strong with it. Thorough fumigation of poultry houses can be carried out by wetting sulphur with kerosene and setting fire. The poultry should of course be out of the way and the house well secured and so left for about two hours.—*Sunday Times* (Perth).

For egg production crushed bones, plenty of lime and clean gravel must be always at hand. Cooked coarse meat chopped up might be given twice a week, and an occasional allowance of green food especially if birds are kept in confinement. A box or barrel of oyster shells, broken up small enough for the hens to swallow should be on hand. A pound weight sprinkled every day will be found none too little for 20 or 25 hens.—*Ibid.*

Here is a recipé for chicken cholera:—2 oz. pulverised capsicum; 2 oz. pulverised asafetida; 1 oz. pulverised rhubarb; 6 oz. spanish brown; 2 oz. flowers of sulphur. Mix thoroughly and keep in an air-tight can. For use take a teaspoonful and mix with the mashed food, and feed twice a day till all symptoms of the disease disappear.

A remedy for scurvy legs is to apply, at the earliest possible stage, a mixture of sulphur and lard, allow it to remain 24 hours and wash thoroughly with strong suds made with carbolic soap.

It is interesting to read an account of the laying competition organised by the *Daily Telegraph* and conducted at Haukesbury Agricultural College, under the supervision of Mr. D. S. Thompson, the Poultry Expert. We can only summarize the results by saying that the Silver Wyandottes led all through, except for a day or two when they were passed by the white Wyandottes at the beginning and by the Buff Orpingtons towards the end.

Mr. T. J. McCue, the Poultry Editor of *Station, Farm and Dairy*, in answer to a correspondent who enquires what is the best breed for a small run for eggs and table purposes, replies: I would recommend Wyandottes or Orpingtons. Both are good layers of a fairly-sized egg, and the chicks grow fast if cared for properly.

TANNING MATERIALS.

(*Continued.*)

In our last issue we considered the tan-producing trees belonging to the order Combretaceæ.

Another order which is characterised by tan-producing trees is Rhizophoraceæ or the Mangrove family. Of these we have a number occurring in Ceylon, and these we shall proceed to consider:—

Rhizophora mucronata (Sin. Kadol.)—This tree occurs in most of the salt-water estuaries and backwaters round the whole coast. Analyses of the bark give rather a variable composition, showing how important it is to secure standard qualities. Thus, Prof. Dunstan found as little as 4-13 per cent. of tannin in the dry bark, and Mr. Hooper as much as 29·50 under similar circumstances. Dr. Busse found in the dried inner bark of East Africa 47·99 per cent of extract, consisting of tannin and brown colouring matter. Extracts of bark gave on examination from 33·5 to 75·94 per cent tannin in the dry substance. The extract from the bark of this tree is considered better than of other mangroves for the purposes of the cotton dyer, but Prof. Hummel considers it far from being equal to the best cutch sold for that purpose. Bark is exported to some extent from Ceylon to India.

Rhizophera mangle (*Candelaia*).—This tree, also known as *Kadol* in Ceylon, occurs though less commonly with *R. mucronata.* A sample of Trinidad bark examined by Messrs. Hunt and Mackay of Leeds gave tannin (by hide powder) 25·10; while the extract or concentrated juice was found to contain 58·30 tannin (by hide powder). The bark of this is also exported from Ceylon to India.

Bruguiera gymnorhiza.—This is one of the species common in the mangrove forests all round the coast. In French Cochin China an extract is made from the bark, and this is sent into the market as a substitute for catechu under the name of *Cay Day.* Dr. Busse obtained 44·71 to 53·12 per cent of tanning extract from samples of this bark from East Africa. Analyses of bark by Prof. Dunstan gave 12·77 of tannin in dry bark; by Mr. Hooper 15·90 tannin and (in dry bark) 15·50; by Dr. Leather 14·81 tannin. While analyses of

extracts by Mr. Hooper gave 57 tannin or 71·7 (in dry bark); and by Dr. Leatter 53·42 to 56·33 tannin and (in dry bark) 64·2 to 60·7.

The wood yields a poorer extract, for while bark prepared at Dehra Dun extracts yielded 33, 46, and 51 per cent by Lowenthal's process, two samples of wood extract gave only 13 and 16 per cent tannin. Bark exported to some extent from Ceylon to India.

Ceriops Candolleana. (Tamil Chirukandel)—This tree is also common in the coastal mangrove forests, as at Negombo and Chilaw. There is said to be a steady demand for the bark in the Calcutta market, where 10,000 to 12,000 maunds are sold annually. The bark gives a considerable large amount of tannin, and gives a deep red colour—with water. From samples of bark examined the percentages of tannin in certain samples from Bengal reached 27·24, equivalent to 31·56 tannin in dry bark. Mr. Hooper also found as much as 26·20 of tannin or 30·20 in the dry bark. The extracts from the bark of this tree have been for some time in the London market. The percentage of tannin in the exact (taken from analyses by Prof. Dunstan, Mr. Hooper and Dr. Leather) is found to rise up to 69·83 and (in dry bark) to 86·95, while extract prepared at Dehra Dun shewed a percentage of 90 of tannin.

Extracts are, as a rule, made by evaporation in the ordinary still, but we are told that "in Singapore, Borneo and Ceylon, factories have been erected for the purpose of preparing cutch substitutes." In Ceylon a special concession was made by Government to a company working in the Eastern Province, but as far as we know the operations there have now been suspended.

Ceriops Roxburghiana.—This tree differs little from the last in habit and foliage. The bark is usually found in the market in the form of reddish-brown quills, and its decoction gives a deep reddish colour and astringent reaction. The ordinary bark examined by Mr. Hooper showed 19·20 per cent tannin. The tannin in the dry bark was found by Mr. Hooper to be 21·10 and by Prof. Dunstan 23·54. A sample of extract from the first mentioned showed 53 5 tannin and (from dry bark) 62·1 per cent. Mr. Gamble of Dehra Dun writes that in practice the barks of *C. Candolleana* and *C. Roxburghiana* could probably be used indiscriminately.

Kandelia Rheedii.—The bark of this tree was found to contain by Prof. Dunstan 11·99 tannin in dry bark, by Mr. Hooper 12·20 tannin and (in dry bark) 13 40, by Dr. Leather 14·54 tannin, but instances have been known of a percentage of 20 and even 27 per cent of tannin occurring. The extracts on the whole are said to be less satisfactory than those from Ceriops bark, and yield about half their weight of tannin calculated in the dry substance.

Carallia integerrima. (Sin. Dawata).—This is a common tree about the sandy lands in the northern part of Colombo. The tree shows its relationship to the mangroves by the large tufts of aerial roots it sends forth from the trunk and branches.

A specimen of the bark received in 1897 from Pegu afforded only 1·5 per cent of tannin. The bark was about half an inch thick and the ash content amounted to 15·2 per cent. It would thus appear that Dawata bark is of poor quality for tanning.

(To be continued.)

NATURE STUDY.

At a recent meeting in London the Duke of Devonshire said:—It is frequently said, and I am afraid with a certain amount of truth, that education as at present conducted is not so fully appreciated in rural districts as I am happy to say it is in towns. If this be so, we have in nature study the means of bringing rural education into the same relation to rural life as to the industries of urban localities. If at present the village labourer takes interest in his children's education, I am afraid it is only too often with the object of enabling them to escape from the drudgery of his own existence, and to exchange it for the more exciting atmosphere of the towns. And if that feeling has its effect on the agricultural labourer, we cannot wonder very much if some country gentlemen and many of the farming class have not hitherto viewed education with any great enthusiasm. At the Board of Education we have long been conscious of this difficulty, and have been most anxious to find some means by which elementary instruction should be brought into closer relation with rural life, and that all classes connected with the cultivation of land should come to feel that education was not antagonistic, but, on the contrary, conducive to the interests of agriculture. To attain this end we could not do much without external assistance. That external assistance has come in this new departure. An influential committee has been formed, including a large number of members of Parliament and county councillors, with the object of drawing up proposals to improve the character of the instruction given in rural districts. The resolutions drawn up were presented to the board, and were accepted with great pleasure and satisfaction by Sir John Gorst and myself. (Cheers.) We have also endeavoured to take some practical steps in the direction of this change. But one difficulty was to find teachers sufficiently conversant with natural science and the objects of country life to impart this new form of instruction. The department now requires that nature study, in its practical and experimental form, shall be taken as one of the subjects of the teacher's certificate examination. In that we have been most cordially assisted by the great majority of training colleges and by many of the county councils. We hope that this new departure may do something to increase the interest felt in schools in rural districts. It must not, however, be supposed that nature study is to be exclusively confined to country schools. I conceive the idea which underlies this movement is that, while there is much to be learned from books, and it would be foolish to neglect those stores of knowledge acquired by those who have gone before us, there is also much to be learnt, not from books, but from the facts of nature; and while the study of books is often only an exercise of the faculty of memory, and may leave almost untouched other faculties of the mind, on the other hand, the intelli-

gent study of nature necessitates observation, and provides a mental discipline that cannot fail to develop those powers of the intellect which it is the object of true education to discover, to cultivate, and to strengthen. (Loud cheers.)

NATURE STUDY LESSONS.

SECOND COURSE IN THE STUDY OF PLANT LIFE.

THE STEM.

From the position of the stem it would strike you that it is a means of communication between the roots and the leaves of plants (the branches large and small being divisions and subdivisions of the stem). But—you might well ask—what is the nature of this communication, and how is it carried on? Before answering this question, however, I must tell you something about the structure of the stem. Now I do not mean to explain to you its ultimate or minute structure, for if I tried to do that I would probably perplex you, and that is just what I want to avoid doing. The study of minute structure in plants (or animals) is a special study known as Histology, a knowledge of which is not necessary for you to understand the functions of the stem. Indeed, I do not want you to acquire a special knowledge of Botany, but to know enough of the plant and the functions of its various parts or organs to enable you to understand its wants so as to be in a position to supply those wants.

The stem—and in fact every part of a plant—is made up of minute *cells* which differ in size, shape and other characters, and these cells combine in various ways to form what are called *tissues* or cell masses, which of course differ according to the character of the cells that go to form them. There are also associated with tissues, *vessels* which you might think of as minute tubes each formed out of two or more cells.

The structure of the stem is characterised by a more or less definite arrangement. Let us take the stem of the mango as representing a very large class of plants. If you examine the stem of the mango, cut right across, you will be able to distinguish the *bark* on the outside, next to it the *wood* occupying much the larger space, and, generally, in the centre, the pith. But between the bark and the wood is a very thin but very important layer of cells forming what is known as the *cambium* or growing layer, which has the power of forming wood on the one side and bark on the other, and so enabling the tree to grow in thickness. Similar active growing tissue occurs at the ends or growing points of stems and branches enabling them to develope in length or height.

See if you could distinguish in a cross section of a mango or rose stem a number of radiating lines running from the pith to the cambium. These are the *medullary rays* which serve as a means of communication between the various parts.

The stem of the coconut as representing another large class of plants is rather different in structure. Here the tissues do not go to form successive layers of bark, cambium, wood and pith, but, when examined on the cross cut, shows a ground work of soft tissue through which the harder potions are irregularly scattered. The so-called bark is really of the same character, but contains a very much larger proportion of the hard tissue.

It is the hard or woody parts of a stem that perform the function of conveying fluids (and all plant food must be in the fluid condition as I will explain later on) from the roots to the leaves. You have all, no doubt, heard the expression "sap-wood," and can probably distinguish the sap-wood from the "heart-wood." Well, it is the sap-wood or fresh outer wood that carries on the work of conveying fluid matter upwards. The inner harder dried wood is what affords us timber.

You must know that there is a good deal of water passing out in the form of vapour through the leaves. (I will tell you more about this when we come to speak of leaves.) Now the constant evaporation from the leaves tends to bring about an upward current of fluid through the stem. This general explanation is, I think, sufficient for you to understand one of the important functions performed by the stem, viz., the conveying upwards of liquid plant food from the roots to the leaves.

Now, I have no doubt, you are ready to put me another question, and that is—what happens to the food materials that are conveyed to the leaves? To fully explain this I shall have to tell you a great deal about the functions of leaves, concerning which I have yet to speak to you. But this much I will tell yow now—the plant food taken up by the roots and passed up by the stem is prepared, or made fit for the use of the plaut in the leaves.

So far as we know, therefore, the course which the ascending sap, as it is called, takes is through the cells forming the younger layers of wood, the vessels assisting when the current is rapid; while the prepared sap is generally believed to descend and circulate through the inner layers of the bark. [The bark I should tell you consists really of three layers which can be well seen in the "shoe-flower" stem as (1) an outer "skinny" layer, (2) a middle greenish layer, and (3) an inner fibrous layer.] If the above facts be true, then if you remove a ring of bark from the stem of, say a mango or orange tree, or bind the stem very tightly with a strong hoop, no increase of wood should take place below the ring or hoop, while a thickening should occur immediately above it,—for the reason that while the unprepared fluid sap travels upward through the wood cells, the prepared sap cannot descend below a certain point where active growth results from excessive nutriment. This is an experiment worth trying, and you should try it.

I have already told you that certain underground stems become swollen and store up

nutriment for the future use of the plant. This reserve food chiefly consists of starch, and as you know such tubers are used as food by man. As examples of such fairnaceous tubers, I may mention the potato (arthapal), yams (kondol and various kinds of "ala"), arrowroot (hulankiriya), and edible canna (butsarana). But the stems of certain large trees also store up fairnaceous matter, as, for instance, the sago palm (sow) and the kitul, sometimes called the "Bastard Sago" palm, the flour (piti) of which you are no doubt familiar with.

We may now consider for a little the uses of the parts of the stem. I have already referred to the value of the wood of certain plants as timber. We have, as you know, many excellent timbers in Ceylon, some particularly valuable and used for ornamental furniture, such as ebony (karuwala) and calamander (kalumederiya); others useful for building purposes such as jak (kos) and teak (Tékka). I need not here refer to the different uses of wood for fuel, paper-making, &c.

The bark of trees which yield tan are used for tanning or the preparation of leather; the "Patana oak" (kahata) and the common country mangrove (kadol) are instances of such trees.

Some woods yield dyes, *e.g.*, jak (kos) yields a yellow dye, and sapan (patangi) a red dye.

Many important drugs are got from the stems of plants. It is sufficient to mention one, viz., quinine, which is obtained from the bark of the Cinchona.

Some trees such as the Hal yield a valuable resin, others like the Dorana yield oil, others again (*e.g.*, Caju) yield gum. Another class of trees, to which the Indian rubber tree belongs, yield rubber.

Many trees, such as Sunhemp (Hana) are valued for the fibre they yield.

Exceptionally we find very soft and spongy stems as in the pith plant (mahadiya siyambala).

The soft succulent stems of certain herbaceous plants such as amaranthus (tampala), and Lassia (kohila) serve as vegetables.

Another very useful substance obtained from the stem is cork, but almost the whole of the cork of commerce is got from one species of oak which is found in Spain, South Italy and North Africa.

I have told you a good deal about the uses of the stem in order to interest you, but what I want you to remember is the important functions performed by the stem, as well as something of its structure; and to take advantage of every available opportunity to examine and compare the stems of plants and to study their structure and peculiarities.

C. D.

RINDERPEST.

Mr. D. Hutcheon, the Colonial Veterinary Surgeon at the Cape, where he has had better opportunities of studying this fell disease among cattle, is about to publish a pamphlet on the subject. The *Agricultural Journal of Cape Colony*, which we are indebted for the following extracts from an advance proof, says with reference to the diagnosis of the disease—often rendered difficult owing to the absence of what are generally considered characteristic symptoms, especially in the earlier stages. The temperature is usually an excellent guide, but this cannot always be relied upon, as we often get a high temperature in other diseases involving the digestive organs. For example, there are many cases of Rinderpest in which the flow of tears is not very marked, and the discharge from the nose barely discernible. There is invariably more or less of a dribbling of saliva from the mouth, but we get that associated with Redwater, also congestion of the liver, and other derangements of the digestive organs; while a violent diarrhœa, the fœces being mixed with blood and mucus, is often the accompaniment of the bowels, caused by cattle eating certain irritant bulbous plants, such as tulp. Numerous cases of acute catarrh are met with also, which simulate the symptoms of Rinderpest very closely, but the discharges from the eyes and nostrils are more viscid than in Rinderpest, while there is no flow of saliva from the mouth, and the fœces are usually normal. In all outbreaks, therefore, in which only one or two animals are affected, it is necessary to make a postmortem examination, and even then, unless the case is sufficiently advanced, the typical appearances—the yellowish-grey exudate of the mucus membranes, and the ulcerous erosions of the fourth stomach and bowels—may not be sufficiently developed to lead to a decided opinion on the case, and unless there is evidence of contagion, further developements must be awaited.

The following are the extracts we are permitted to give from the Journal referred to:—

"On viewing the carcase of an animal that has died of Rinderpest, the body is generally much emaciated, and the natural orifices are soiled with a dirty discharge, and the carcase exhales a peculiar fœtid odour. The principal and pathognomonic lesions of Rinderpest have their seat in the mucous membranes of the digestive tract, the respiratory passages, and the urinary apparatus. The mucous lining of the mouth is congested, and covered over with a slimy mucus. It presents a bright salmon colour, but if the beast has been killed and bled before examination, this bright pinkish colour disappears. The epithelium is frequently found detached in places, leaving small ulcerated-looking spots. These are met with most frequently on the under surface of the tongue, inner surface of the lips, and on the dental pad. The mucous membrane of the fauces and pharynx is the seat of catarrhal inflammation, and covered with thickened mucus—sometimes purulent. The nasal mucous membrane is likewise the seat of catarrhal inflammation, its surface being covered with purulent mucus, and towards the openings of the nostrils, small ulcers or abrasions are frequently met with. After passing the pharynx and larynx, there is very little change to be observed in either

the trachea or œsophagus. Slight catarrhal inflammation is sometimes met with in the bronchial tubes, with collapse of some of the smaller lobules. Pulmonary emphysema may also be present, but, as Williams remarks, this is due to the formation of gases in the areolæ of the connecting tissue. But the changes in the lungs are neither constant nor pathognomonic, and are secondary as a rule. There is sometimes echymotic patches on the endocardium of the heart, and similar spots are met with, occasionally, on the epicardium, with a little fluid in the pericardial sac. On opening the abdomen, the peritoneum is congested and very frequently spotted, and there is a variable quantity of a yellow serous fluid in the peritoneal cavity. It is comparatively rare to find any pathological changes in the first and second stomachs, although a little serous infiltration is sometimes met with under the epithelial lining.

"The third stomach is generally hard, and the food between the leaves dry and caked. But very frequently, more especially if the sick animal has been allowed to drink large quantities of water, the contents of the third stomach are found quite fluid.

"It is in the abomasum or fourth stomach, and the intestines, where the most marked and characteristic changes are met with. The mucous membrane of this stomach is the seat of acute catarrhal inflammation, the sub-mucous tissue is swollen, and infiltrated with a serous effusion, especially on the rugæ or folds. The mucous membrane is also swollen, and its epithelium detached—desquamated—in patches of various sizes, leaving ulcerated sores, more particularly near the pyloris or bowel, and, where these ulcers present the appearance of dark eroded sores, with the yellow degenerated tissue resting in their centres, small petechial spots are often found studded all over the congested area.

"In the small intestines we find congestion and inflammation of varying degrees of intensity, with a muco-purulent greyish yellow exudation, in some cases covering innumerable small spots scattered all over the mucous membrane of the bowels; in other cases this exudation is found covering almost the whole surface of the mucous membrane. In more severe cases this presents the appearance of a thick croupous-looking exudate, which—in parts—forms a complete cast of the bowels.

"In such cases the epithelium is thickened, softened, and is found detached over large patches throughout the small intestines, leaving the membrane red and granular looking. Peyers, glands or patches are generally inflamed, swollen, and denuded of epithelium. The changes in the large intestines are not usually so well marked or so uniform. In many cases the inflammation is more in patches, and in the rectum the mucous membrane is often intensely inflamed, and presents a blood-streaked appearance. The epithelium is swollen, and covered over with a muco-purulent exudate, while there is more or less infiltration of the sub-mucous tissue. In many severe cases, however, the large intestines are just as seriously affected as the small, with numerous small patches of desquamated epithelium. It is a very curious fact also that many of the cases which manifest the most severe external symptoms do not show the most characteristic *post-mortem* lesions.

"The liver very often appears congested, and presents a yellowish colour of varying tints. In many of the cases, however, the liver is perfectly normal in character and appearance, and the gall perfectly healthy. The mucous lining of the gall-bladder is sometimes inflamed, especially about the base of the sac, and studded all over with blood spots. The gall presents varying shades of colour, from a deep green to almost blood red, and is often thick and curdy looking. The mucous lining of the urinary bladder is sometimes affected also in patches with a little sub-mucous infiltration, and similar appearances present themselves in the vagina of the female. It is not my intention to go minutely into all the *post-mortem* changes which may be observed in individual cases. The most marked and pathognomonic *post-mortem* appearances are those seen in the mouth and upper air passages, and in the fourth stomach and intestines.

"The medicinal treatment of Rinderpest is seldom followed by any satisfactory results. A large number of medicinal remedies were tried, such as germicides, anodynes, astringents and laxatives, alone and in various combinations. Some of these appeared to exercise a beneficial effect, but I am strongly of opinion that the varying success which attended the administration of these several remedies depended more upon the mild or severe nature of the particular outbreaks, than upon any specific action exercised by the medicine. In its usual virulent form, ten per cent. of recoveries was considered a very fair average, but in some outbreaks fifteen, twenty and up to thirty per cent. of recoveries were recorded, more particularly during the hot dry summer weather.

"In India they have had the same experience. Pease says :—'The disease in some parts of India, and notably those parts which are naturally hot and arid, where the temperature of the air rises very high, is frequently noticed to be of a far milder type than is the case more particularly in the hills, and it has appeared probable that desiccation of the virus by the great heat and dryness influences its virulence to a considerable extent—60 to 65 per cent. of recoveries may sometimes be observed in the hot districts of the plain.'

"I think there can be little doubt that dry heat does exercise a modifying influence on the virulence of the disease, but it does not altogether account for the exceptionally mild form that the disease assumes on individual farms here and there in a district where the climatic and other conditions are similar to those on other farms adjoining, where the disease presents its usual virulent character."

Be that as it may, I am of opinion that if careful statistics could be collected, it would be shown that, where the affected cattle could be properly

attended to, comfortably sheltered from the hot sun in summer, and from the cold in winter, kept away from an unlimited supply of water, and given nourishing gruel to drink, that a higher average of recoveries would follow than where a large number of different medicines are used. I do not mean to infer that medicine is useless in Rinderpest; some may modify the symptoms and alleviate the suffering, but none of the medicinal remedies that I have tried, or heard of being used, appeared to exercise any very marked influence on the course or character of the disease. The Indian Cattle Plague Commission agreed that mild laxatives in the early stages of the disease did good, and Veterinary Surgeon Thacker, who is reported to have treated 2,541 cases of the disease with great success, always gave three ounces of finely divided sulphur in two quarts of gruel morning and evening, until some slight laxative effect was produced.

"The principal methods of inoculation against Rinderpest practised in South Africa are bile and serum. The former is used both fresh and glycerinated, and the latter in the form of preserved serum, and as blood freshly drawn from a recovered animal.

"Inoculation with pure bile, either obtained from an animal affected with Rinderpest immediately after death, unless the duration of the disease has been unduly prolonged, or from an affected animal killed while in the last stage of collapse. which is usually about the sixth or seventh day of the fever, or the tenth or twelfth day after artificial infection. *This is Koch's method.* The dose recommended is 10 c.c., injected into the cellular tissue under the loose skin of the dewlap, and well rubbed in.

"Koch's instructions were to use biles of a dark green colour with a white froth, and it is generally acknowledged that these are the best, but experience has shown that biles of all shades of colour, except those which are red from the presence of blood, and those which are very thin and of a light yellow colour, may be used so long as they are clear and free from any putrid smell. 'Animals which were injected with brownish green gall containing the Simpson bacillus in pure culture, and gall of a brown colour, containing both bacteria and streptococci, became immune without the occurrence of any accidents such as abscesses.' (Kohlstock.)

"As the bile obtained from different animals may vary considerably in strength and immunising properties, all the galls extracted at one time, after being kept separate for twelve hours to see whether they remain all right, should be mixed together, so as to render them as uniform in strength and character as possible. If practicable bile should be used within from eighteen to thirty-six hours after it is drawn, unless it can be kept in ice, when it will keep sweet and effective for a much longer period; but even under such conditions, it should not be kept over four days, as its immunising properties are liable to become modified when kept beyond that period.

"Further experience indicates that the bile obtained from cattle which contracted the disease spontaneously, and is extracted immediately after death, is generally more reliable than bile obtained from cattle which are given the disease artificially, by the subcutaneous injection of virulent blood. Hence smearing the muzzle and nostrils with infective material was considered a more satisfactory method of infecting animals for bile production.

"In connection with this subject Dr. Eddington says in his Annual Report for 1897, page 67:—'That according to the recent researches of Fraser, the bile of all animals has peculiar antitoxic virtues, and he suggests that the ingress of poison by the alimentary tract is attempted to be met with, and antagonised by the bile secretion, so that the giving of Rinderpest to animals by the natural channel may—and I think probably does—stimulate bile production. Further, where infection is made through the gastro-intestinal tract, the poison must, in the first instance, act through the portal vein; while in subcutaneous infection the virus must be carried to the liver, for the most part along the branches of the hepatic artery, a most important difference, seeing that in the one case the action proceeds with regard to the hepatic lobules centripetally, while in the other case it proceeds centrifugally."

GENERAL ITEMS.

In the account of a new edible tuber in the *Agricultural Gazette of New South Wales* occurs the following passage:—"Its taste, when cooked, is very agreeable, resembling that of Japanese Crosue] or salsify, while it is richer in alimentary equivalents than either of these legumes." Whether the word Japanese qualifies the term salsify, and if so, whether the plant is a legume, we cannot tell, but the vegetable ordinarily known as salsify (*Tragopogon porrifolius*) belongs to the order Compositacæ.

As soon as tomato plants show signs of disease, they should be at once sprayed with Bordeaux mixture made up as follows:—Dissolve 4 lbs. bluestone (sulphate of copper) in water (hot water if possible) after "powdering" the bluestone, and mix thoroughly 4 to 6 lbs. of fresh quicklime with water: then mix the two and add 40 gallons of water to bring to the proper strength.

The most commonly used colouring matter for dairy produce (cheese and butter) is the vegetable extract from *Bixa orellana*, known as "annatto," which was so successfully manufactured in Ceylon by the late Messrs. Borron and VanStarrex of Crystal Hill Estate, Matale. Referring to annatto the *Journal of the Board of Agriculture* says:—"This and other yellow colouring matters of vegetable origin, turmeric, saffron, &c., have generally been considered harmless in the quantities employed, but they are being gradually superseded by coal tar yellows, the action of which on the human system is not fully known. Butter from Holland, Australia and the United States is very frequently coloured with coal tar yellows. A large number of margarines are also so coloured. The coal tar yellow most frequently employed for dairy produce and margarines is

known commercially as "butter yellow" (*Dimethylamido-azo-benzene*) and is generally supplied ready dissolved in oil, either cotton seed, rape, linseed or sesame (gingelly) oil. Tropœolines, derived from coal tar, are also coming into use.

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400 lbs. weight of fowl manure is equal in value to 2,400 lbs. farmyard manure. In one ton of the former analysis showed 48·60 lbs. phosphoric acid, 48 lbs. potash and 67 lbs. nitrogen; while farmyard manure contained only 6 lbs. phosphoric acid, 10 lbs. potash and 11 lbs. nitrogen in a ton.

Rice-paper, says the *Weekly Scotsman*, is not made from rice, but from the membranes of the bread-fruit tree. This is certainly news. The rice-paper tree is well known to be *Fatsia papyrifera*, the paper being manufactured out of the pith. The famous papyrus used as paper by the ancient Egpytians, was, however, prepared from the pith-like tissue of the tall stems of a sedge (Cyperus).

In sowing cow peas, 10 lbs. will suffice for an acre if sown in drills, and 40 lbs. if sown broadcast (which is not to be recommended). The fattening value of the cow pea will, it is expected, bring it into the near future into general cultivation.

Other names for the common gram used as a horse food with paddy (know in the vernacular as "kadala") are Bengal gram, chick pea, rams' horn, and coffee pea. The plant is said to be a native of Armenia, and has been cultivated as a human food for over 3000 years. Next to cereals it forms the largest part of food in Spain, India, and Africa. The presence of oxalic acid in the clammy oxudation on the leaves makes them unsuitable for fodder. The crop ripens in about 4 months, and the yield of seed is sometimes as high as 100 bushels per acre.

Tagassrte (*Cytisus proliferus albus*), so much written about as a fodder plant, is a shrubby perennial legume. The seeds are slow in germinating and need soaking for about 24 hours. At the end of about the third year cattle or sheep may be turned into the field, and the crop will require no further attention except occasional cutting back to prevent too high growth. The leaves and twigs are said to be very nutritious, and the plant worth a trial in dry hot districts, for when once established it is practically unaffecced by draught.

The vines of the sweet potato are in some places used to make an excellent hay; while in India *Crotolaria juncea* (Sin. Hana) is grown to feed milch cows.

"What does my land require?" is a question we have been told many a struggling farmer would like to have answered, but it is not easy to give an answer. It may be obtained most readily, it has been thought, by analysis of the soil. That it is obvious must be unsatisfactory unless there is a considerable area of the soil evidently all alike in its component parts. Where the land is so mixed as it is on most parts of our coast country, any analysis can only be useful for a limited area. It has been urged that cheap analyses would be a boon to farmers; but to be useful they would have to be numerous, and would thus run away with money. Soil analysis, like mill testing, is good as far as it goes; but as the dairyman looks to his churn for proof of excellence, so the arable farmer must look to his crops for proof of the quality of the soil.

A correspondent to the *Queensland Agricultural Journal* says that warts on a cows' teat could be cured by the application of molasses twice a day.